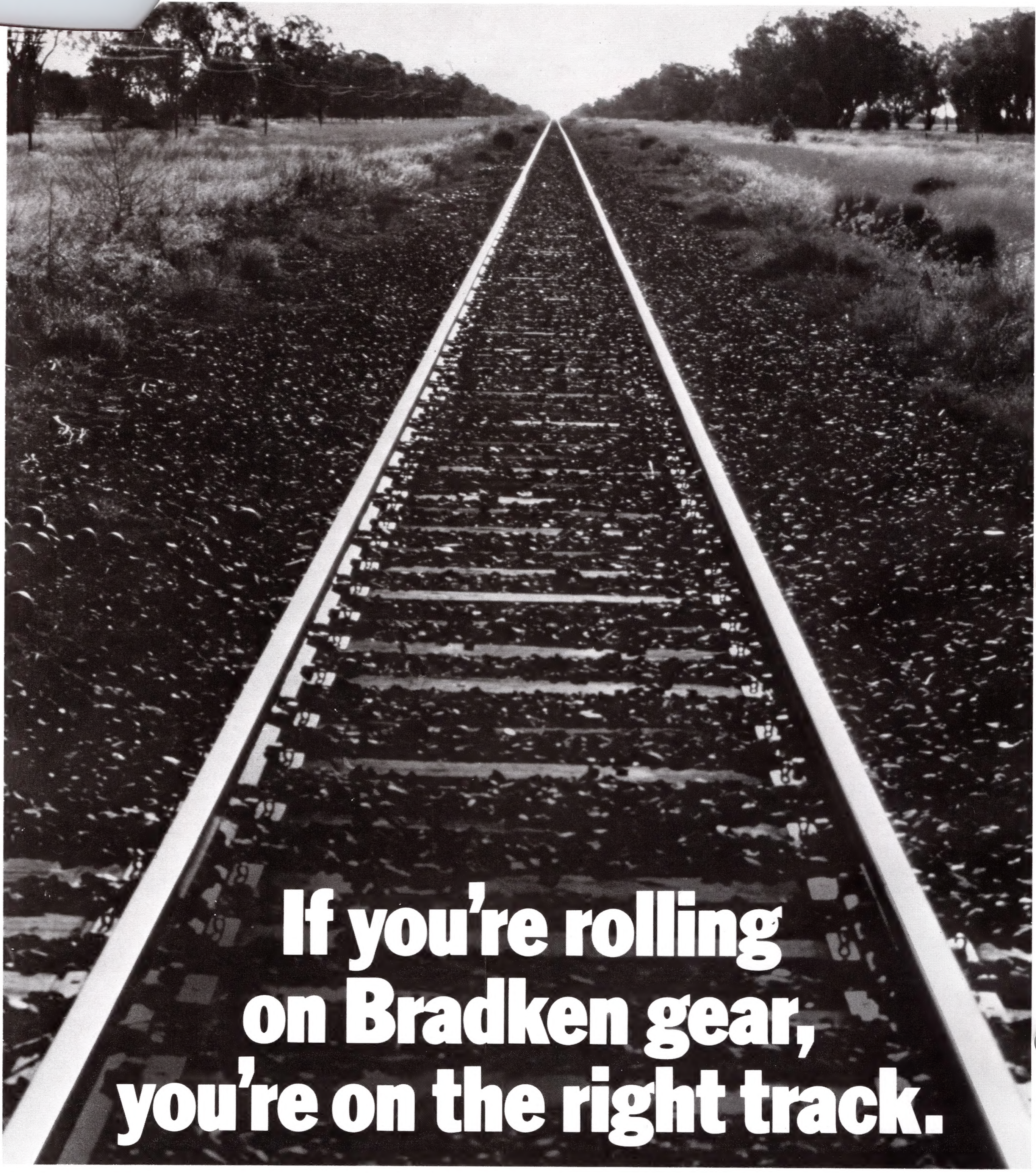
Vol. 26 No. 1 January, February, March 1989

NETWORK

THE RAILWAYS OF AUSTRALIA QUARTERLY

FREIGHT'S fighting strategy. **AUSTRALIAN** LRV's at work in Hong Kong. **ATCS:** Rail's high-tech future. **QUEENSLAND'S** driver-only study.



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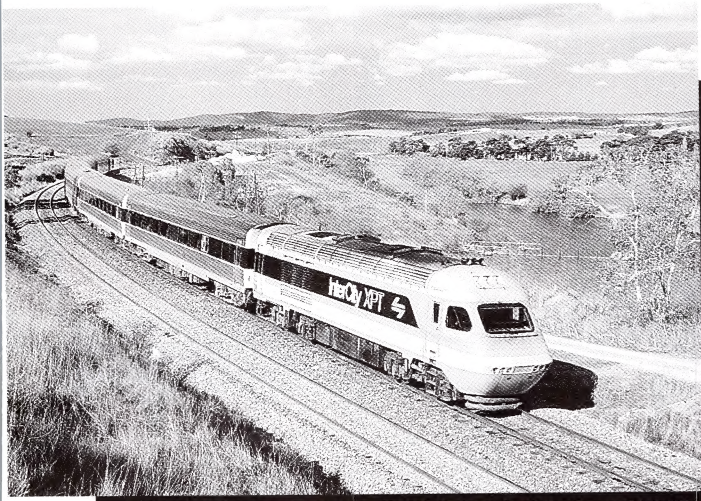

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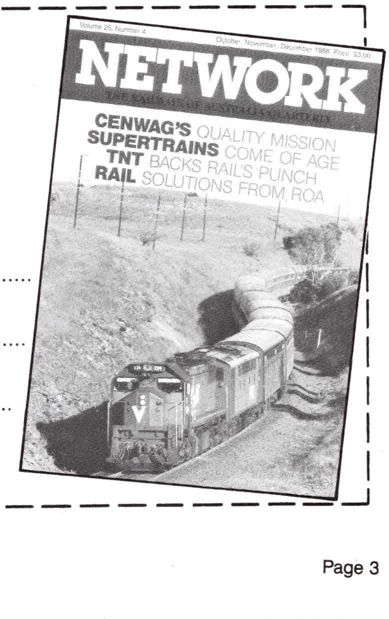

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NETWORK

THE RAILWAYS OF AUSTRALIA QUARTERLY

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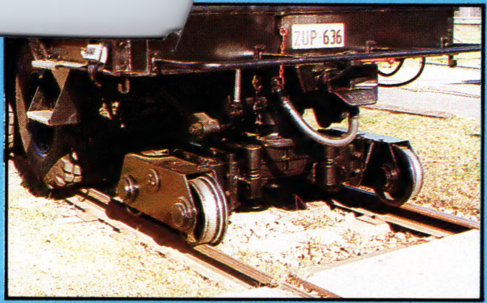
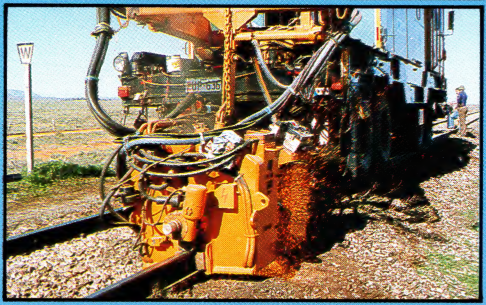
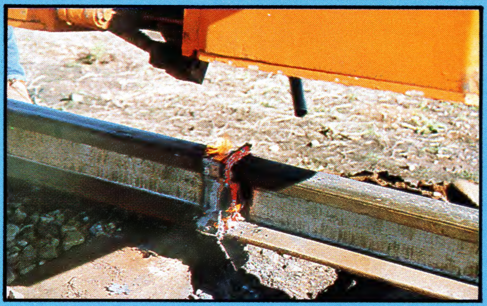
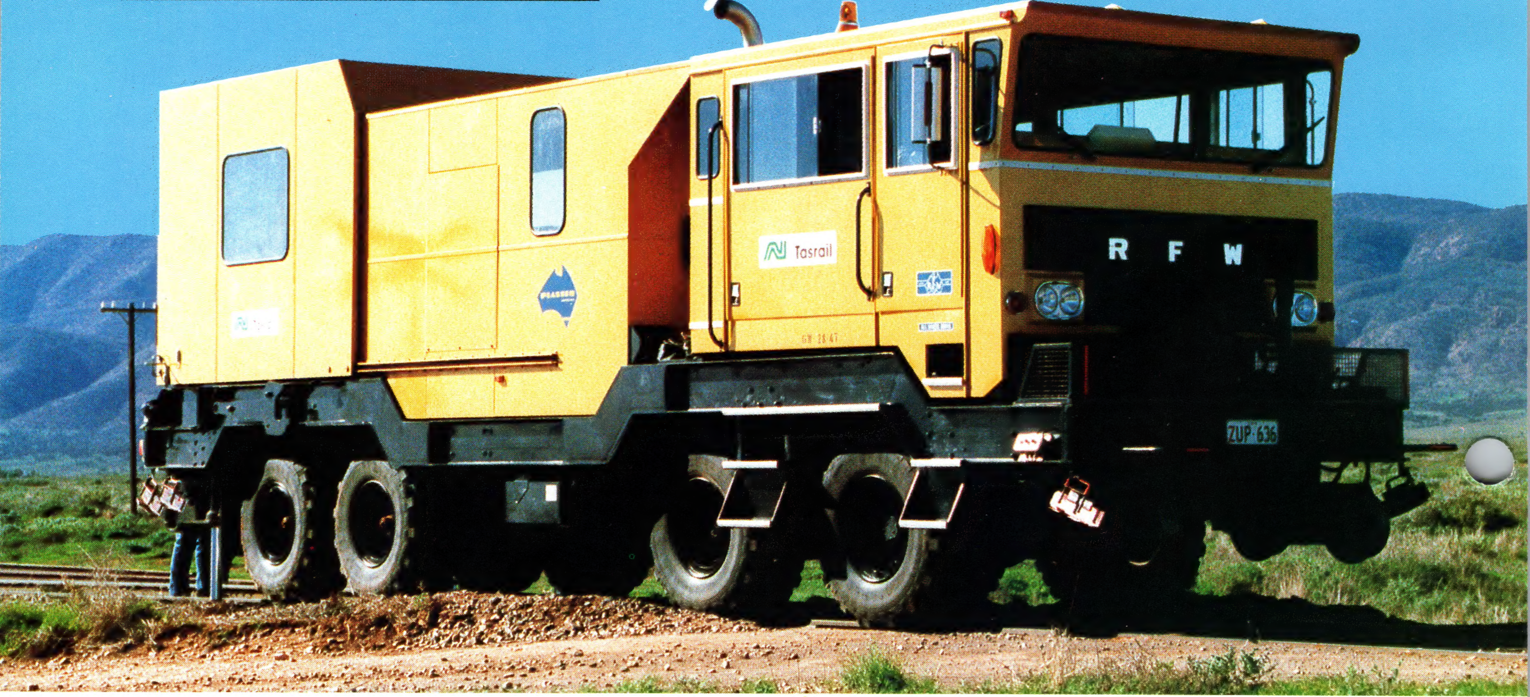
TNT BACKS RAIL'S PUNCH
RAIL SOLUTIONS FROM ROA







On road, on rail, weld done!



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THE RAILWAYS OF AUSTRALIA QUARTERLY

Volume 26, Number 1
January, February, March 1989

AN's carousel: Saving space, ending injuries and avoiding costly delays.

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- *State Rail Authority of New South Wales*
- *State Transport Authority – Victoria (V/Line)*
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The only requirement of contributions to Network is that they be informative or entertaining and that their subjects be relevant to the wide interests of railway people today. Where viewpoints are contrary to those of the editor or Railways of Australia, we must accept that these differences are an essential element of a lively and interesting magazine.
PROUDLY PRINTED IN AUSTRALIA

CO-OPERATING FOR SUCCESS

M.C.G. SCHRADER

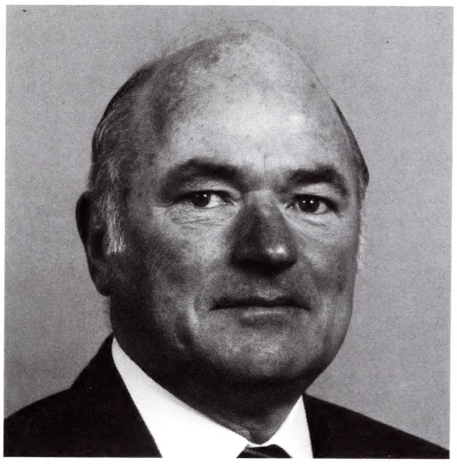
Nearly three years ago in this column, I talked of the first Australia and New Zealand Railways Techonology/Research conference. The third in the series was held in Melbourne in October 1988 with the theme "Commercial Success – We're in it Together", and papers made the point that all facets of railway activity should be aimed at one goal: serving our communities in a competitive and commercial way.

In varying degrees, all of Australia's rail Systems now have this charter. Of course, there will always be community service obligations, which are non-commercial, but these are increasingly being spelled out and accounted for appropriately.

The papers presented in Melbourne acquainted delegates with developments in their own and other areas that might assist them in pursuing their broad aim. They covered topics ranging from marketing strategy to the way costs can be saved in engineering and infrastructure. This year, for the first time, we invited suppliers to the industry to give papers and to take part in the full conference. Representatives from Australia's private railways have always been included.

The keynote address was given by Mr Bruce Redpath, AM, chairman of Mayne Nickless. The conference dinner was addressed by Mr Peter Laver, general manager transport of BHP. Both companies are major customers of rail, and both speakers made comments which were thought-provoking and pertinent.

I detected a significant groundswell of thought amongst conference delegates. Coming mostly from Australia's five government-owned railway Systems, participants were very much aware of the differing requirements they had to meet in their daily work. There are obviously areas where greater co-operation is possible, however – for example, in design of locomotives, development of wagon monitoring systems, modern safeworking techniques, designs of wagons, and the management of the changes so necessary if railways are to survive. It became increasingly evident that there is room for greater co-operation, and that savings can be made if experience is shared. It is not always necessary to re-invent the wheel when approaching a project that is new to one particular rail System.



At one point, the debate went even further: the keynote speaker asked whether perpetuation of five separate rail Systems would always be necessary. And aspects of that question were tackled throughout the conference.

At ROA, our task is primarily to co-ordinate the intersystem activities of our railways. But when an opportunity presents itself, we shall look beyond this.

As far back as 1885, in the Argus newspaper, Mr W. N. Fehon, who later became a Commissioner for Railways in New South Wales, proposed the joint management of the New South Wales, Victorian and South Australian Railways under one board "entirely free from political control".

The idea of unity then is not new. And complete achievement of it may never by seen as the right answer. But there are certainly ways in which ROA can play its part in moving railways closer to commmercial success by facilitating much greater and closer co-operation.

FREIGHT'S FIGHTING STRATEGY

Freight is the fastest-growing of the markets serviced by rail in Australia, including the transport of minerals, grain, and heavy industrial finished and semi-finished products, and it is a market in which rail has been successful despite the strong competition of the road freight industry.

Interstate rail freight tonnage grew by 8 per cent and revenue by 12 per cent in 1987-88 – much more than most business growth rates.

In the last financial year, the combined interstate tonnage of all Australian rail systems was 8.2 million tonnes. Intersystem freight accounted for 15.3 per cent of total rail revenue.

If rail is further to increase its market share, systems must act together on market development and the provision of reliable services for customers.

The National Freight Group was set up in 1984 to help all rail authorities co-ordinate their interstate business strategies. Integration of information systems and planning of rollingstock requirements were included. The group is responsible to the National Freight Committee, consisting of the senior marketing executives of each Australian rail authority under the Chairman, currently Keith Fitzmaurice, Managing Director of V/Line.

National Freight Group co-ordinator Jack Harris was appointed in 1987. Formerly Assistant Marketing Manager with Australian National, Jack is ideally suited to his present job. He has worked in railways across the country for more than 30 years. He is assisted by Malcolm Cameron and Andrew Malowiecki, who have extensive business planning backgrounds. Jack's approach is to focus on improving the level of service offered by rail in the highly competitive interstate freight markets.

"We believe that if the rail systems could really integrate their interstate marketing and operations plans, we would outcompete road in the three main markets," he said. These are the Western Australian corridor, the east coast commodity markets, and the east coast general (container) freight markets.

"We could not just outcompete but put them out of business to a large extent.

"Already rail has the lion's share of the rapidly-growing freight business to and from Perth, although trucks are making inroads in the general freight area."

According to Jack, there is enormous potential for rail to increase its share of the iron and steel, paper, and automotive traffic on the eastern seaboard, as well as intercapital container freight in the Brisbane-Sydney-Melbourne-Adelaide network.

"The key to our future lies in the reduction of transit times, increased rail wagon payloads and productivity, improved service reliability, and the elimination of loss or damage in transit," he said. From a customer's viewpoint, transit time is the time from the freight's collection at origin to its delivery at its destination.

"Rail has lagged behind road in the development of lightweight, purpose-designed, faster, and heavier-carrying vehicles," said Jack. "The success of the Superfreighters has been due to a more intensive use of existing rollingstock. The growth of container freight is currently restricted only by the loading and unloading capacities or turnaround times at the terminals, and the limited availability of container spaces or rollingstock.

"We have been reviewing services in all interstate markets to improve the

THE NATIONAL FREIGHT GROUP IS INTEGRATING RAIL'S PUSH FOR INTERSTATE FREIGHT

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performance of rail in line with market demands. This involves close contact with clients on both operational and business matters. Basically, they need to know in advance all the service specifications, including the timing of their freight in transit from place to place, and to be kept informed of any changes.

"The market wants a disciplined, structured service with absolute reliability and minimum risk of loss or damage, and rail is in the business of satisfying that demand."

The Australian rail systems are concentrating on making intersystem services profitable, and the National Freight Group is encouraging change. It helps prepare freight surveys, plans, and budgets. It monitors performance and makes recommendations on operational and business objectives (including finances and accounting). It is a sort of think tank with a national perspective on transport issues.

Jack Harris says that there is every prospect of rail being ahead of road in the eastern state corridors within the next decade, provided rail can fully develop an integrated systems approach. This means the systems must recognise that interstate freight is rail's major future growth opportunity. Their operating practices must be standardised, their traditional rivalries resolved and their planning objectives and the time-frames for achieving them co-ordinated.

"It also means we recognise what the competition is offering and where it is heading with, for example, longer driving hours, heavier gross weights, and increased speeds," said Jack. The introduction of "B" trains will offer road operators opportunities for cheaper costs.

Rail's record in technology has not been impressive. It needs to develop new generation rollingstock with higher mass (heavier weight) and higher cubic carrying capacity. Greater clearances are needed on all routes, through new low-level flat wagons and double stacking of containers.

It is imperative for rail to reduce delays in transit by a national monitoring of all rollingstock and an advanced programming of fleet requirements.

"We are also involved in forecasting throughput demand at the interstate freight terminals to plan for traffic increases," said Jack. "We work with the rail systems on projects such as Superpak with the State Rail Authority, and a study of the future of LCL (less than container load) freight."

The bigger transport companies have separate profit centres for each state. Despite the transfer costs of such operations in some circumstances, they aim for optimum strategies through co-operation at all levels.

"That's what we're doing in the railways with the intersystem freight business," said Jack.

One of three gantry cranes for handling containers at V/Line's South Dynon Terminal. The terminal handled 90 000 containers in 1987/88 and is being upgraded to handle 300 000 by 1992.

"It's going 110kph, the engine temperature is 90° and there's an axle hotting up in the last wagon."

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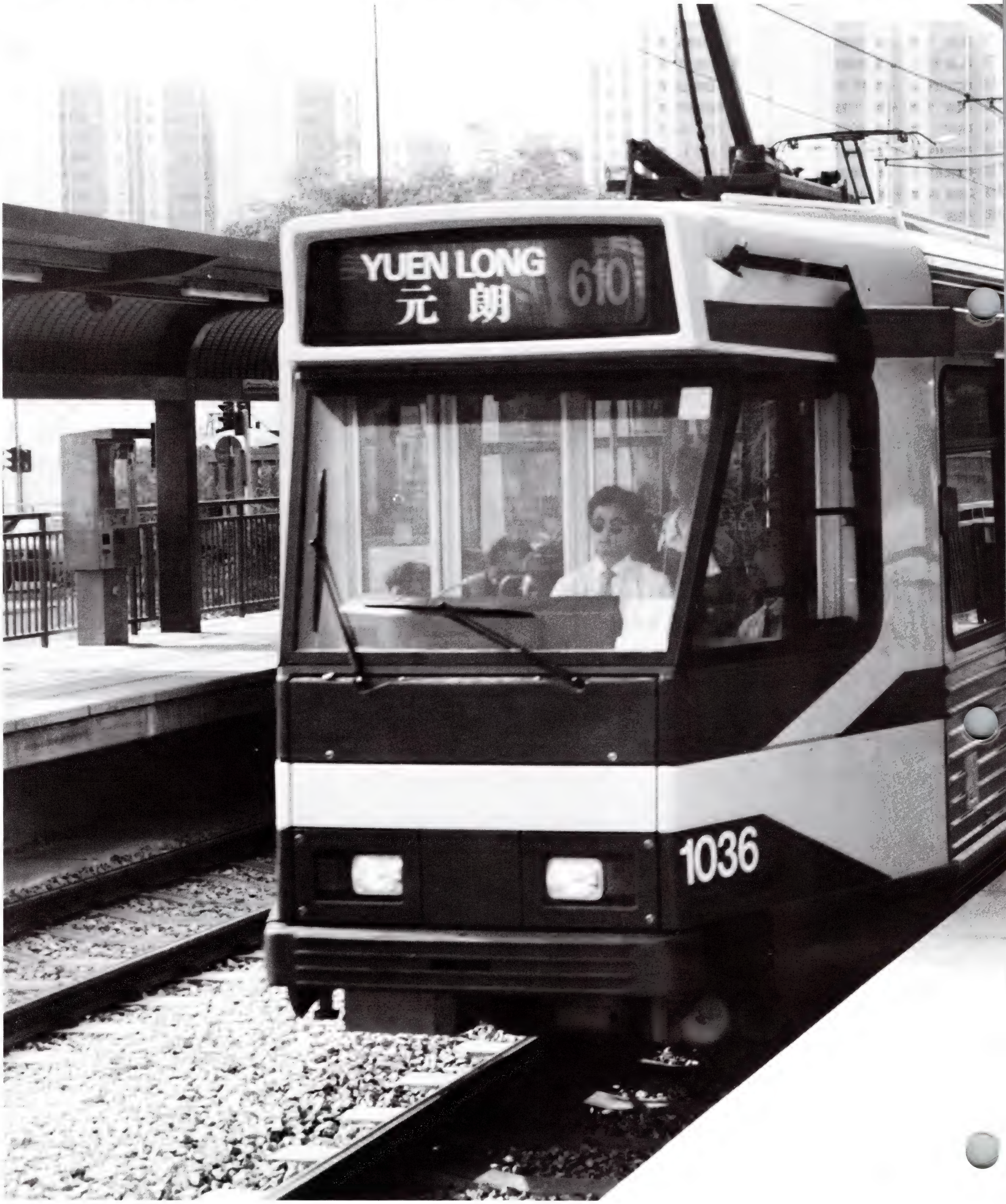


START WORK

COMENG'S ALL-AUSTRALIAN LIGHT RAIL VEHICLES ARE MOVING PEOPLE IN THE NEW TERRITORIES

The Australian company Comeng has completed delivery of Australia's biggest export order for rail vehicles – 70 light rail vehicles designed and built for the new light rail system recently opened in the New Territories of Hong Kong.

The contract was won against international competition and called for vehicles designed to operate in conditions that include typhoons and tropical temperatures and humidity.

The central business district of Hong Kong and Kowloon is well served by the Mass Transit Railway, but most of the less populated New Territories must rely on diesel buses for public transport. In 1972, the Hong Kong Tramways proposed the building of a tram system for the fishing village and rural centre at Tuen Mun in the north-western district. This proposal was not followed through, but it correctly predicted the needs of a community planned to expand rapidly from 40,000 to 500,000.

A transport study was done in 1977/78 and the plans for the new town of Tuen Mun opted for an exclusive transport corridor with a light rail system in preference to buses on long-term economic as well as environmental grounds. In 1983, the Kowloon Canton Railway Corporation (KCRC) was invited to build and operate the light rail transport system for the region.

Australian-made light rail vehicle travelling between Tuen Mun and Yuen Long in the New Territories of Hong Kong.

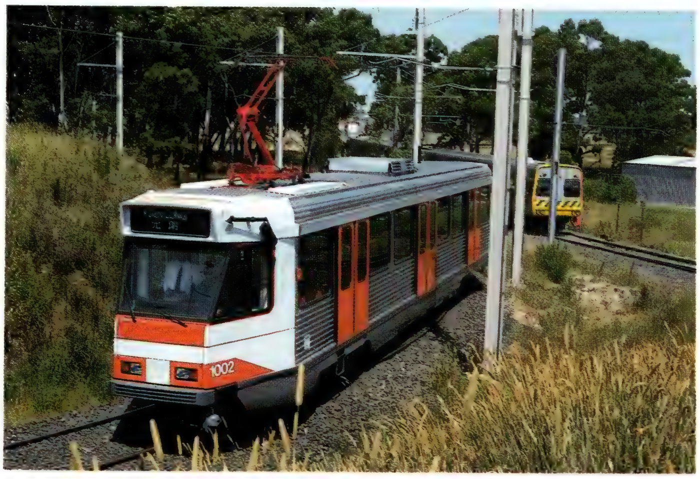
The KCRC commissioned new studies, which confirmed the long-term feasibility of the proposal, and early in 1985 five pre-qualified groups were invited to bid for the building of the first phase of the project. The KCRC awarded the turnkey contract for the complete system to the Australian Leighton-MTA consortium, and the sub-contract for the vehicles was subsequently awarded to Comeng.

The light rail transit system (LRT) provides the main public transport within Tuen Mun and a link to the township of Yuen Long. In keeping with the UITP definition of light rail, the system is an intermediate stage between a modern tram and a full size Metro.

The 23km of standard gauge double track is all at street level and is largely segregated from other traffic. Most of the track has 54kg/m rails on concrete sleepers in ballast, but the small radius curves are similar to tram practice. The stops are closely spaced and all have platforms 910mm above rail level.

Electric power supply is at 750v on an overhead line nominally 5.6m above rail level. Most of the contact wire is weight tensioned and the weights are hidden inside the catenary support posts to avoid disturbance by cyclonic winds.

At road intersections, approach detection equipment in most cases changes traffic lights to give priority to the LRT in time to avoid braking. Signals are not used to control vehicle movements on plain sections of the line. The route is selected and controlled by a central computer, which monitors the location of each LRV and sets the points without any intervention by the driver.



Above: LRV for Hong Kong being tested on Comeng's specially-built test track at its Dandenong, Victoria, plant. A vehicle for Melbourne's system is in the background.

Left: Cab of a Hong Kong LRV.

Right: Busy commuter stop in the New Territories.

TABLE 1
Leading dimensions

	Melbourne A	Tuen Mun
Coupled length	N/A	20200
Body length	15030	19400
Width	2683	2650
Roof height	3410	3415
Overall height	3410	3665
Floor level	862	950
Bogie centres	8500	11000
Bogie wheelbase	1800	1900
Wheel diameter (new/worn)	660/600	720/660
Tare mass (kg)	21500	27000

TABLE 2
Capacity and performance

	Melbourne A	Tuen Mun
Seating capacity	42	60
Crush load capacity	125	215
Maximum speed (km/h)	70	80
Acceleration rate (m/sec/sec)	1.6	1.3
Deceleration rate (m/sec/sec)	1.6	1.5
Emergency braking rate (m/sec/sec)	3.0	2.6

HONG 康
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The specification for the Tuen Mun LRVs required 70 state-of-the-art vehicles. Their design and equipment are closely related to modern trams, such as the latest vehicles being supplied by Comeng for the Melbourne Transit Authority, but the Tuen Mun conditions made a new design essential.

These environmental conditions include typhoons as well as tropical temperatures and humidity. The vehicles must remain in service in typhoon signal 8 conditions, which represent a steady wind speed of 35 to 64 knots, with gusts of up to 100 knots. They must not overturn if properly parked during signal 9 or 10 conditions, for which the steady state wind speeds will exceed 48 or 64 knots. They must operate on roads that are awash during heavy rainstorms.

The single-ended vehicles have three sets of outside sliding doors on one side only and 60 seats arranged in a 2+1 formation, with double-seat units opposite the doors to obtain the maximum seating capacity. The bogie centres are slightly off-set to balance the asymmetric internal arrangement.

A high standard of passenger comfort has been ensured by air conditioning, noise isolation, a smooth ride and contoured seats. The high quality of the vehicles is in keeping with the specified life of 30 years at an average usage of 120 000km a year.

A single air conditioning compressor and condenser unit is located under the car, with the evaporator and fan section in the roof at the centre of the vehicle. Conditioned air is distributed by a duct above the ceiling.

The vehicles bodies are made from stainless steel for a long-life, high-strength, low-mass structure that will be almost maintenance-free in humid Hong Kong. The ends are of glass-reinforced plastic and can be quickly replaced if necessary. The vehicles can be equipped with couplers and can operate in groups of three cars if required.

The monomotor bogies are similar to those fitted to the latest LRVs supplied to the MTA by Comeng. Resilient wheels, and rubber chevron primary and air spring secondary suspensions ensure a high standard of ride comfort for the passengers, a low outside noise level and low dynamic loading of the track.

Comeng LRV on a commuter run in Hong Kong's New Territories.

The traction motors and their right angle drives are frame mounted.

The AEG traction equipment has microprocessor control of the gate-turn-off (GTO) chopper power regulation system, with electrodynamic and regenerative braking.

The Knorr braking system is also microprocessor controlled to obtain stepless operation of the spring-applied, air-released disc brake fitted to each axle. The friction brakes are fully blended with the electric brakes to minimize energy use and maximise brake pad life. Magnetic track brakes can be used to rapidly reduce speed under emergency conditions.

A PA system in the vehicles is integrated with the radio communications to allow announcements to be made by control staff.

In addition to normal tests, a Tuen Mun vehicle had to be run for 30 000km to demonstrate reliability before delivery to Hong Kong. This required a standard gauge test track with an overhead power supply energised at 750v dc. A permanent test track was built at the Comeng works at Dandenong.

Most of the finished vehicles were transported to Hong Kong on special road trailers carried on "Roll-on Roll-off" ships. Final testing on the Tuen Mun tracks included a 400km service demonstration.

Driver training began at the end of 1987, and the first of a number of open days was held to allow the public to experience a modern LRV. As more vehicles and track became available, driver training intensified. By May 1988, almost all of the track and the overhead was commissioned.

The complete system was taken over by the customer on schedule on 7 August 1988, and the full revenue service started in September. Initial usage has been up to expectations, and the predicted usage will average 270 000 passenger journeys a day initially, rising to 360,000 by 1991.

Leading dimensions of the Tuen Mun vehicles are listed in Table 1 with the corresponding measurements for the last series of single unit trams supplied to the MTA for operation in Melbourne.

Performance data for the Tuen Mun and Melbourne vehicles are listed in Table 2.

SR TRANSFORMED

Under the most radical changes in New South Wales's 133-year railway history, State Rail's operations will be split into two autonomous groups and the prime site of Transport House headquarters above Wynyard Station sold off.

The State Rail Chief Executive, Mr Ross Sayers, predicts a "pared-down, leaner" white-collar segment of the authority as a result of splitting the operations.

Sydney's suburban and intercity services will be one of the major business groups, while freight and country passenger services will combine for the second.

"The new structure will simplify the organisation and provide focused management," Mr Sayers said.

The changes signalled a dramatic reduction in the need for central head office personnel, according to Mr Sayers. Functions now performed at Transport House by around 2000 employees would be absorbed by the two groups.

"Management staff should be located at the scene of the action," he said.

"Relocations will not be immediate but it is expected Transport House will be redundant in about two years, as alternate accommodation is established. I believe Transport House wil realise more than $80 million on today's market."

Mr Sayers said the restructuring was the first step in a programme to simplify State Rail's management.

"The present 15 layers of management do not allow for the efficient flow of decisions," he said. "There will be no immediate reduction in staff numbers, but as management in the new structure focus on their new role and improve the level of efficiency, we expect staff savings.

"Any staff reduction will be managed over time by natural attrition, retraining and redeployment, early retirement and voluntary severance."

Rob Schwarzer, now Group General Manager of State Rail's suburban and intercity services.

Vince Graham, new head of freight and country passenger services.

Under the new structure, the Deputy Chief Executive, Rob Schwarzer, becomes Group General Manager of the new Sydney Commuter business, while the Grain Handling Authority Managing Director, Vince Graham, takes over the state's Freight and Country Passenger section.

Mr Graham is a former General Manager of State Rail's Freight Services. He left the Authority just over two years ago to take up his GHA appointment.

Mr Schwarzer, who spent 18 months as Chief General Manager of the NSW Urban Transit Authority, has been with the railways for 29 years. His new task is to weld the suburban and intercity services into an efficient, modern network providing first-class passenger facilities and much improved financial performance.

He will head all support services involved in running the busy network, which last year carried 240 million passengers.

Vince Graham joined State Rail in the early 1970s and was involved in developing its modern materials handling systems, the introduction of unit train operating techniques, particularly in wheat transport, and the development of major commercial contracts.

From 1983 up until he went to the GHA, he was responsible for developing, marketing and operating all State Rail's freight services.

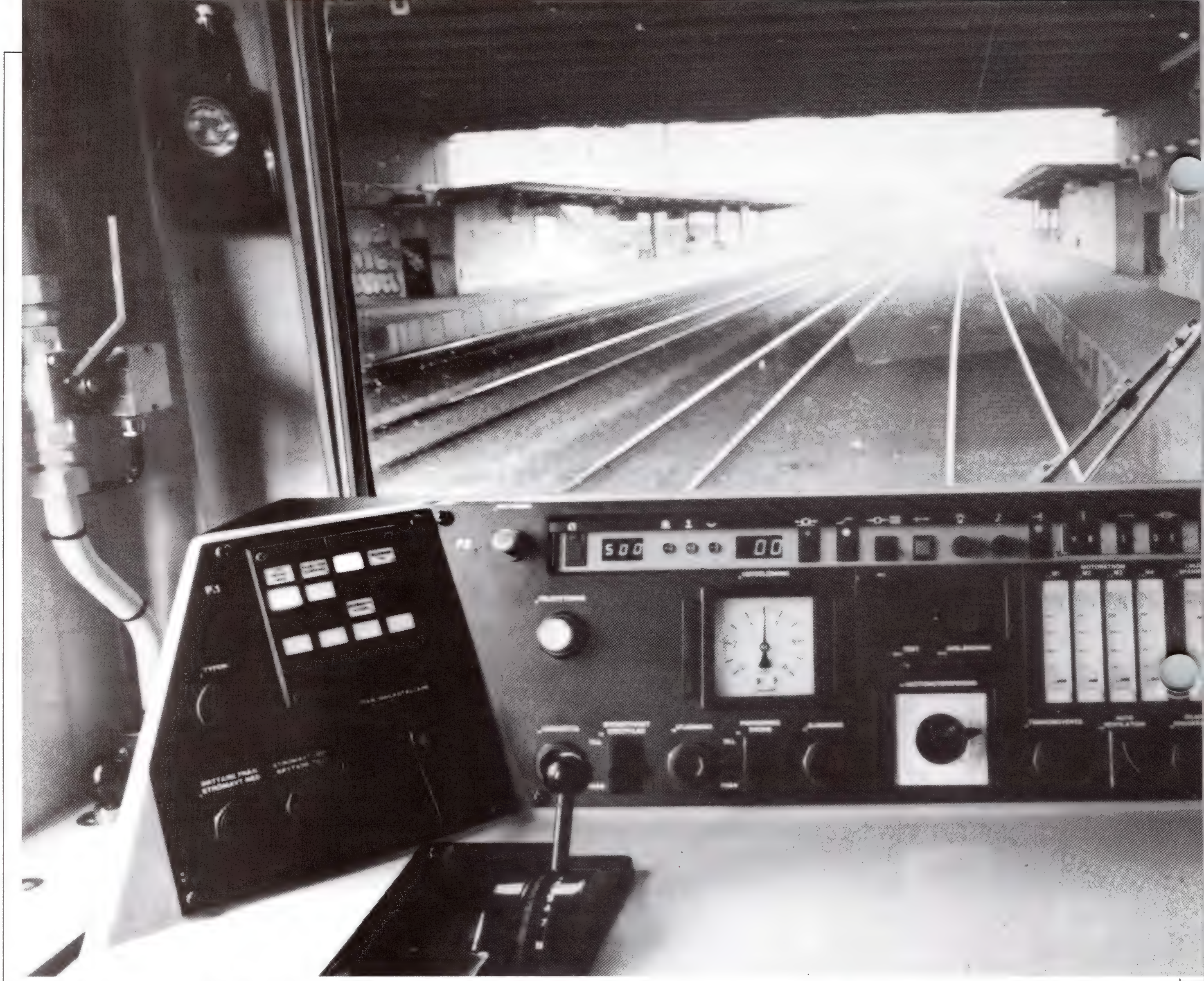
His first task, given priority by Mr Sayers, will be to increase railways' share of the State's freight business. He will also take over the country passenger system, which uses the same track as freight trains on the non-suburban system.

Mr Sayers said the two new business groups would be autonomous and accountable for their profit performance but subject to the direction of the corporate office. Their brief included the development of long-term strategic plans.

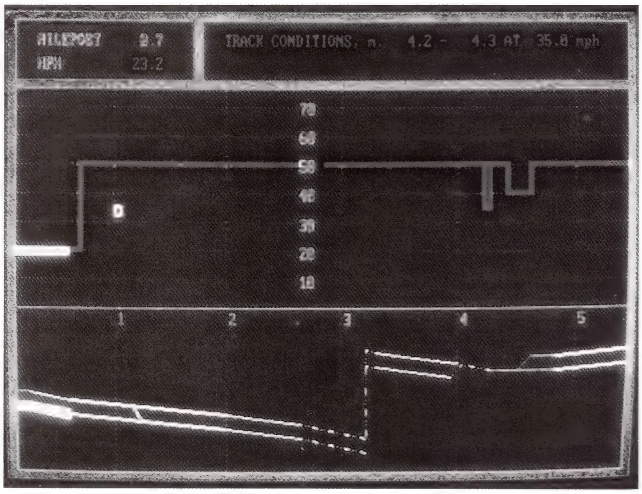
The task of managing the transformation of State Rail's operations into two groups has been given to a special group headed by the former Commissioner for the Department of Motor Transport, Mr Mike Butler, who will also clear the way for the sale of the York Street headquarters.

More than 2000 people now work in the 12-storey building, but the number is expected to fall as staff are transferred into the two business groups at other locations. This may take up to two years.

Mr Butler will also oversee the establishment of the small corporate head office.



One part of the future of rail: Driver's view of the information display of the Swedish Standard Radio and Telefon automatic train control system to go into service on Perth's suburban trains.



MILEPOST 0.7
MPH 23.2

TRACK CONDITIONS, n. 4.2 - 4.3 AT 35.0 mph

An ATCS engineman's display shows four sections. Top left is location and speed, the latter flashing or turning red when excessive. Top right is special information, such as track work ahead.

The centre and lower sections are graphs. Both scroll to the left as the train, shown as a broad white line, moves. The upper graph is of speed and location. The red line contains the territory the train may occupy and the maximum speed at each point. The white mark at mileage 1.0 indicates that, at present control settings, the head of the train will pass that point at 35mph in one minute's time. The fine white line at 28mph shows the required pacing speed.

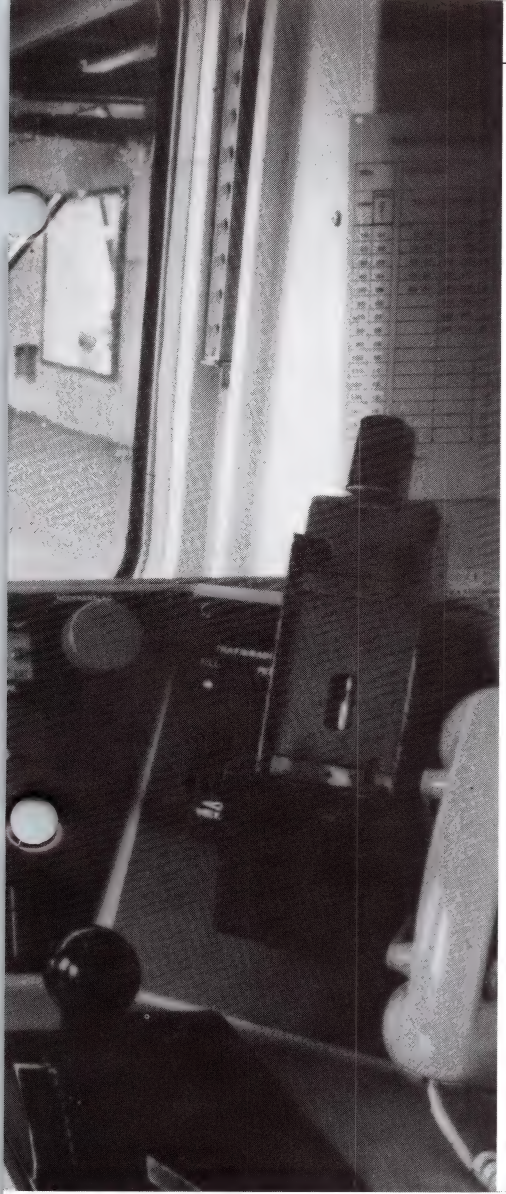
The lower graph indicates track layout and gradient, suggesting action to prevent further build-up of speed.

Australian railways are now investigating Advanced Train Control Systems (ATCS) that will in future markedly improve the efficiency of train operations and, even more importantly, change the way railways do business.

A number of railroads throughout the world are now installing systems based on recent developments in electronic and computer technology. The most widely publicised of these is the Advanced Train Control Systems (ATCS) project being conducted jointly by the Association of American Railroads (AAR) and the Railway Association of Canada (RAC). Through Railways of Australia, Australian rail systems are also supporting the project.

The goal of the ATCS project is the precise and continuous control of all resources involved in train movement.

When fully developed, ATCS is intended to form three interconnected systems. The first involves analysing the commercial requirements of rail consignments. This is followed by the generation of the most cost-effective



THE FUTURE OF RAIL

ADVANCED TRAIN CONTROL SYSTEMS WILL CHANGE THE RAIL BUSINESS

train plan. The third controls the use of the principal assets of a railway — people, energy and capital equipment — to carry out the plan.

The integration of commercial tasks and operations is the long-term key to ATCS's full development. Railway customers will be provided with a better service at a lower cost.

The ATCS project is now dealing with the third system, and principally with the development of performance specifications for hardware, for example, radio, transponders, and interrogators as part of the overall architecture of the system. (Software, which might, for instance, be capable of continuously updating timetables, is not part of the project.)

How will ATCS work? It has four distinct levels:

- Level 10, centralised route and block interlocking system.
- Level 20, automated transmission and display of instructions on board the locomotive.
- Level 30, full train tracking.
- Level 40, full field interlocking.

Progression from one level to the next is accomplished by adding key capabilities, each one permitting the introduction of a number of new features and options.

Level 10 ATCS is elementary but forms the foundation for ATCS and is intended for application on manually controlled routes. Microprocessor-based equipment at the dispatcher's work station provides interlocking logic to prevent overlapping authorities from being used.

Level 20 incorporates the vital data communications link and microprocessor-based equipment on locomotives, while Level 30 introduces an automatic location and identification system to keep track of train location and identity. It also involves a wide range of options related to computerised train operations both by the central computer and by on-board computers (OBC). Remote point switching from the locomotive is incorporated at this level.

The key element in the architecture is the use of voice and data radio in train control and train management. Train location at higher levels is by a track-locomotive transponder interrogator system backed up by a locomotive odometer.

This must be preceded by a computer-added despatch system, similar in design to that now being used by some railroads.

At the next level, train control advice is displayed on board the locomotive, and if computers are installed on board, driver advice is provided.

As an example, a driver advice display system being considered in Canada is shown in the illustration. It provides three sets of information. On top of the display are the current location, speed and details on a speed restriction ahead of the train. The red line indicates the maximum allowable speed. The train is shown as a white line and the predicted train speed in one minute as a white dot. The bottom display shows the layout of the track and gradient, giving the driver a view ahead.

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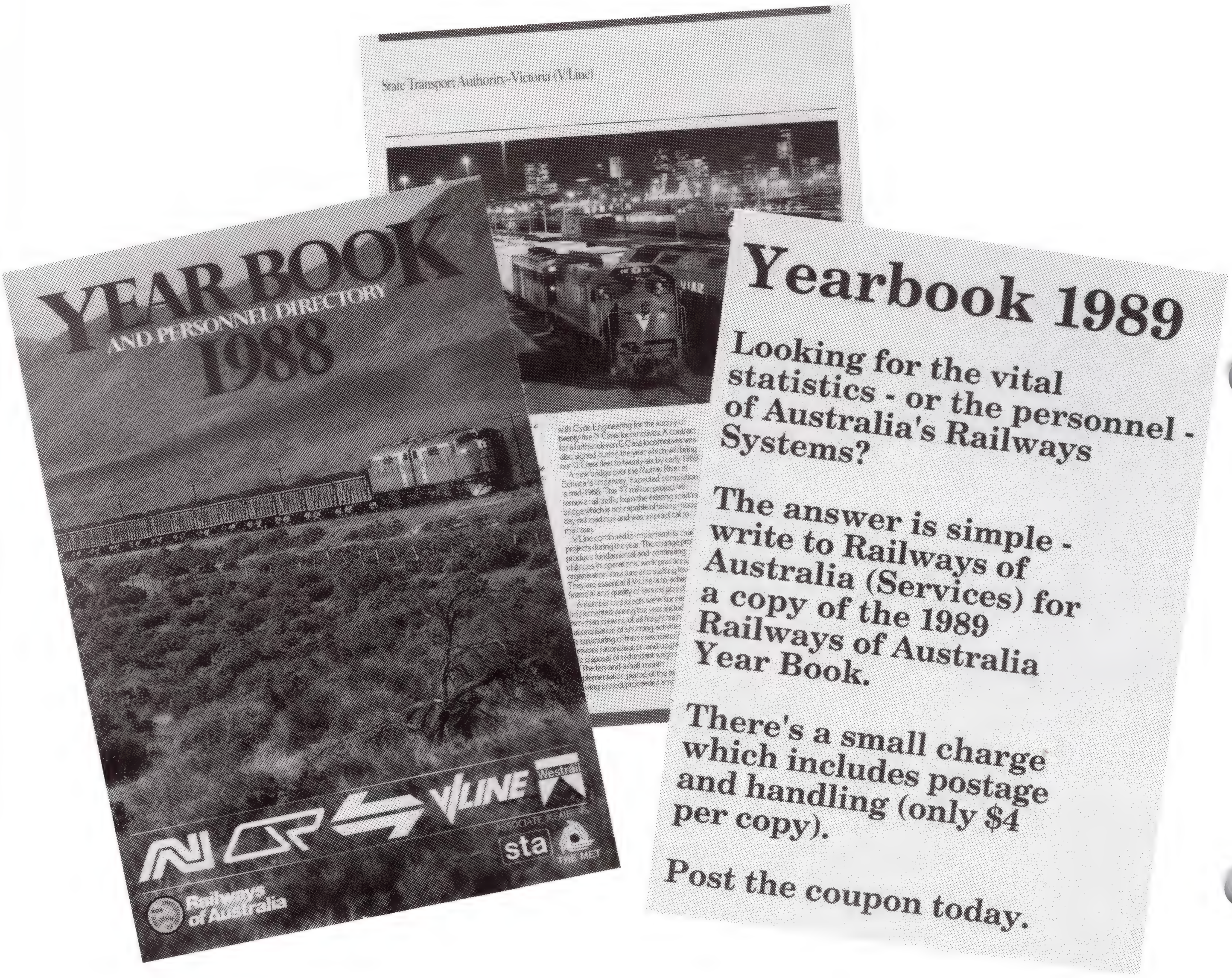

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State Rail archivist Tam Best: Records must reflect the structure and functions of the organisation.

STRAIGHT RECORDS

SR ARCHIVE UPDATE PAYS OFF

Archivist Thomas (Tam) Best joined State Rail in October 1985 and found the NSW railways records going back to 1849 in a terrible mess – to put it mildly.

Tam, 37, originally from Glasgow, Scotland, started in records managment with the British Foreign Office in London in 1969.

He later did a postgraduate Diploma in Archives Administration, then worked in the Australian National University archives in Canberra from 1980 to 1982.

For the next three years, until he joined State Rail, he worked at setting up the archives of the Royal Australian College of Surgeons in Melbourne.

Tam needed all his experience when he started to sort out the "cardboard box" filing system that he inherited at State Rail.

Now, three years after starting his task, Tam has transformed the archives into a well-ordered storage and retrieval system for records and other materials that dealt with 4000 inquiries in 1987.

"The archives houses some 700 shelf metres of records, which, if stacked end for end, would be more than twice the height of Sydney's Centrepoint tower," says Tam.

"We also hold more than 200 000 plans and drawings, about 60 000 photographs and negatives, and a sizable reference library.

"Before I came to State Rail the archives had never been under the control of a professional archivist. Fortunately, although there were no authorised subject headings or set filing rules, there was a remarkable consistency because the person earlier responsible had maintained a card index for a long time.

"What made my job very difficult at first was the fact that the materials collected had been disarranged by various attempts to subject-classify them.

"This approach, while carried out with the best of intentions, had effectively destroyed any meaning the records held for the ordinary business of the Authority.

"No organisation creates records because individuals at that time think the records might be of interest to researchers in another 50 or 100 years. Records are created and kept by an organisation so that it can carry out its day-to-day business.

"It is a vital principle of all archives work that records accepted into archives for permanent preservation are retained in the original order and arrangement under which they were maintained by the creating officer. This principle ensures that offices transferring records to archives are able to recall files and other materials when required.

"It also ensures that the evidence implicit in the records reflecting the structures and functions of the organisation and its operation is preserved."

Why does State Rail need to maintain an archive? The main reason is to help it do its job. For example, on a recent major engineering project on State Rail property, sub-surface conditions were creating site problems.

Eventually, engineers went to original survey plans held in the archives. These explained the reasons for the problems, and allowed the engineers to select an alternative route without having to go to the expense and delay of resurveying the site and surrounding areas.

How does Tam Best decide which records ought to be kept and which ones can be thrown out so that offices don't disappear under heaps of defunct records?

"State Rail, like all other state government instrumentalities, is governed in the disposal of records by the provision of the Archives Act," Tam says.

"The Act requires that the approval of the Archives Authority be sought for the destruction of records. We are now developing guidelines and procedures which will enable Authority officers to secure such approval and routinely destroy records not required for permanent preservation.

"Records of continuing value to State Rail will be identified and can be transferred to archives when they are no longer needed for current business."

State Rail archives: They exist to help the organisation do its job.

State Rail's Archives Section uses a computer to keep track of its records, and many other parts of the system use computers. The problems that this is likely to cause for archives in the future are now one of Tam's major worries.

Magnetic tapes and discs are fragile and require careful handling and special storage conditions.

The information they contain can be deleted at the touch of a button, and the software and hardware used to create them can become obsolete overnight.

State Rail records are also open to private researchers. An inquiry might take two minutes to answer, or it might take two weeks (or two years) of research by the person making the inquiry.

Train buffs and family history enthusiasts (checking to see if Uncle Fred really was a station master) can be a nuisance but Tam does his best to answer their queries.

"After all," he says, "they have just as much right as a professional historian or engineer to search the non-current records.

"They might not know exactly what it is they want to know, and they might not know which records are going to tell them what, and they certainly don't know or care how much work goes into making sure that the records can be made available, but their money helped pay for the creation and maintenance of the records in the first place."

QR PASSENGER RECORD

CITYTRAIN NETWORK CARRIES 32 MILLION

Queenland Railways' suburban passenger services carried a record number of passengers during the six months of World Expo 88.

Estimates are that passenger journeys exceeded 32 million on Brisbane's Citytrain network between 30 April and 30 October – an increase of 40 per cent on the same time in 1987.

More than 18000 extra surburban trains were timetabled in one of Australia's biggest transport operations.

The south bank site of Expo, adjacent to the central business district, was served by two railway stations, Vulture Street Expo and South Brisbane Expo. A $2 million pre-Expo refurbishment of these stations included restoring the facade at South Brisbane and providing ramps for the disabled at Vulture Street.

More than 260 trains served the Expo stations on weekdays with slightly fewer at weekends.

Expo traffic on top of normal network usage placed great strains on the Citytrain fleet, which was almost fully operational until at least 8pm on weekdays.

The special timetable for Expo used 81 of the 88 three-car electric sets. The remainder were tied up by servicing and inspections. In addition, the seven-car diesel-hauled sets were heavily used.

Expo passengers travelled by electric train on the Cleveland, Beenleigh, Ipswich, Ferny Grove, Shorncliffe, Doomben, Caboolture, and Nambour (Sunshine Coast) corridors.

From September, new electric intercity cars were introduced on Nambour-Expo services. These cars will be used between Brisbane and Rockhampton from mid-1989 after the completion of main line electrification.

About 12000 free parking spaces were available at stations to ensure access to the electric trains to Expo.

The port of Newcastle's capacity to receive coal for export was increased 20 per cent when the NSW Minister for Mineral Resources and Energy, Mr. Neil Pickard (third from left), opened a new road and bridge serving the Post Waratah Coal Services coal loader. With him were (from left) Mr David Boyd, general manager, Port Waratah Coal Services, Mr George Keegan, MP for Newcastle, and (right) Mr Stan Droder, chairman of the board of directors of Port Waratah Coal Services.

A QUEENSLAND JOINT MANAGEMENT AND UNION TEAM HAS VISITED SIX OVERSEAS RAIL SYSTEMS TO STUDY

THE DRIVER-ONLY OPTION

Rail systems will lose their share of the competitive freight market unless they keep their operations streamlined. Queensland Railways has visited Europe to look at ways of cutting operating costs by running locomotives with only drivers on board.

A joint management-union task force visited six overseas systems to inspect and discuss this type of operation.

In September and October, the task force visited British Rail, Swedish State Railways, Deutsche Bundesbahn (Federal Republic of Germany), Bern-Lotochberg Simplon Railway (Switzerland), Swiss Federal Railways, and French National Railways.

Members of the task force were Mr. Ross Dunning, (Deputy Commissioner and Secretary, Queensland Railways); Mr. David Mills (Industrial Relations Manager, Queensland Railways); Mr. John Keogh (Manager, Operations Research, Queensland Railways); Mr. Pat Dunne (branch secretary, Australian Railways Union); Mr. Barry Powell (divisional secretary, Australian Federated Union of Locomotive Enginemen); and Mr. Peter Byrne (acting president, Queensland division, Australian Federated Union of Locomotive Enginemen).

They have reported that driver-only operation is practiced on all types of trains in the six systems. The train operations covered include intercity passenger, suburban passenger, freight, and mineral. On yard shunting locomotives the driver is the

Swiss driver-only shunter was one of the driver-only operations studied by the Queensland team.

A Swedish remote-controlled locomotive in action. Swedish State Railways operates freight trains of 700m in high- and low-density traffic areas with a driver only.

2
SBB CFF FFS

59

only person in the locomotive cabin.

Passenger trains travelling at up to 140km/h are operated in all systems with a driver the only person on the locomotive. On intercity passenger trains, guard conductors travel in the passenger coaches. Their presence depends on the number of passengers on the train, or the number of stops to be made.

Suburban passenger trains in Europe are operated by a driver only. The driver uses mirrors or closed-circuit television cameras to monitor passengers joining and leaving the train.

Freight trains of up to 5400 tonnes, with a length of 700m are operated in high- and low-density traffic areas with a driver only.

In extreme temperatures (—40°C to +30°C) in the Arctic Circle in northern Sweden, a 5000-tonne iron ore train operates with driver only between Kiruna and the Norwegian port of Narvick.

All the systems visited operate shunting locomotives with a driver only. The driver and ground staff are in radio communication in the continental systems. British Rail provided radio communication where land signalling is not possible.

The Swedish and German railways operate driverless locomotives remotely controlled by shunters on the ground.

Driver-only operation is used in all types of safe working systems, from the latest centralised traffic control and automatic train control systems to token systems. Wide body locomotives, which have good visibility to the front, are used. Rear-vision mirrors are provided on locomotives in most systems.

There are very few restricitions on the types of rollingstock used on driver-only-operated trains. Ordinary drawgear screw couplings are universally used. All systems operate without end-of-train monitoring equipment. The last vehicle on the train is fitted with a battery-powered light (end-of-train signal).

Radio communication of various degrees of reliability is provided by most systems. British Rail does not consider it essential for driver-only operation. Wayside telephones are provided in nearly all systems.

The selection and training of drivers throughout the systems was most comprehensive, with the training period varying between 14 and 24 months. The task force also investigated shift times, meal periods, pay rates, and other conditions of driver-only operation.

The task force agreed that driver-only operations were suitable for Queensland in some areas and could come about through consultation between management and unions. The task force stressed that thorough driver training was paramount if driver-only operation was to be introduced.

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WESTRAIL LOWERS DEFICIT

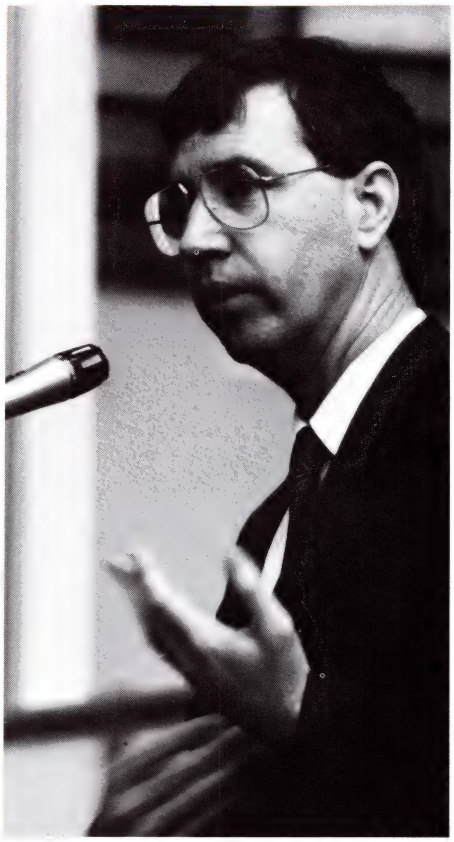
Western Australian Minister for Transport, Mr Bob Pearce, has announced a 24 per cent improvement in Westrail's commercial financial performance in 1987/88 – a deficit of $14.9 million compared to the previous year's $19.6 million.

It was the fourth successive year in which Westrail had lowered its deficit. The conventional financial result, which included community services, was a loss of $77.3 million. This was an increase of $20.7 million on the 1986/87 figure because of an increase of $23.3 million in superannuation costs.

Westrail carried 22 million tonnes of freight and almost 10 million passengers in Perth and the country during the year. Highlights were a big increase in transport for the aluminium industry, which enjoyed a buoyant year, and the success of interstate freight, a record of 1.8 million tonnes.

The new Australind train carried double the passengers of its predecessor.

Income increased by $7.5 million to $276 million, despite the loss of $7 million from grain transport because of last summer's poor harvest.



Western Australian Transport Minister Bob Pearce at Midlands workshops.

Mr Pearce said that Westrail's continuing financial improvement was the result of major gains in efficiency over recent years.

"The efforts of Westrail's 5600 staff are reflected in the fact that freight charges have fallen in real terms for the third year in a row. Charges to farmers have been dramatically lower. For instance, Westrail recently announced another reduction in grain freight charges, which brings the accumulated saving over the past four harvests to 35 per cent. The present rural revival will give Westrail an excellent chance of making a commercial profit in the next couple of years," Mr Pearce said.

Westrail's top three freight income areas in 1987/88 were agriculture at $84 million, mining at $48 million, and interstate freight at $39 million. Passenger income was $44.3 million, including a $30 million payment by Transperth for operating the surburban services.

Capital spending in 1987/88 was $29 million, including $3.6 million on new rollingstock and $7.4 million on track improvements.

Major continuing projects were the purchase of 15 new locomotives for $42 million, the moving of rail facilities from central Geraldton and Albany at a combined cost of $14 million, and the building of 60 wheat wagons costing $7.5 million.

WA INQUIRY AWARDS NEW ROAD LICENCES

The WA government has concluded an investigation into the provision of passenger transport services to a huge area of rural Western Australia to find the best and most economical service for routes totalling almost 6000km and serving towns as far north as Meekatharra and as far south as Esperance.

Invitations went out to bus operators, including the existing operator, Westrail, to bid for all or part of this network. The outcome is a mixed system. Minister for Transport Bob Pearce announced that, while Westrail would retain its licence for all its services, there would be competition in the more densely populated south-west corner of the state.

"It would have been irresponsible for the government to even consider replacing such a socially important service as Westrail," he said.

The new licence arrangements are based on what Mr Pearce said was a disappointing response by private operators to a call for expressions of interest in providing contract services over the entire network.

Only Westrail and one private operator, South West Coach Lines, submitted proposals for the south-west area of Western Australia. No operator showed interest in the other parts of the network. As a result, Westrail has retained the licence for all its routes, but South West Coach Lines has had its tour licence upgraded to allow it to compete in the South West. Some restrictions on Westrail in this part of the state have been lifted.

The opportunity given to private operators to provide essential services to country centres appeared to have been squandered, Mr Pearce said – especially by operators who had pressed the government for such a move.

The Westrail Commissioner of Railways, Mr Jim Gill, told road service staff that retaining bus licences was the favourable outcome of cost-saving measures.

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Hannan's Melbourne warehouse: "Our competitors are all moving our way, using more rail containers."

HOW RAIL CAN MAKE THE MOVES

Today rail carries only 20 per cent of furniture moved interstate. But if the enthusiasm for rail of the removalists G. Hannan and Sons is any guide, road transport's share could well be reduced to that proportion by the turn of the century.

More people than ever are on the move in Australia, with idividuals moving seven times in a lifetime on average.

Competition is tough in the interstate furniture moving business. But Hannans have kept ahead of their rivals with better technology and a better service based on using rail as the main transport method.

"One word sums up the difference between us and the others," says Ray Hannan, joint general manager of G. Hannan and Sons. "That word is care."

In the early days of the firm, there was only Garnet Hannan. Today, there are three sons, a daughter and three nephews in the company. It is a big family enterprise with 153 years of service between the Hannan boys and the Allen nephews. In addition, there are about 105 staff around Australia, most with long years of service.

"We bring a container on a truck out to a house and carefully wrap and pack each household item into modules of seven cubic metres capacity," says Ray Hannan. "The average house holds five modules or the same as one full container. These modules have been specially designed and patented by us to give complete protection in transit.

"The furniture is not handled again until the container is unloaded at the house of its destination interstate."

Hannans is noted for its attention to all the details of a move – from the individual wrapping of valuables in special materials, to storage and insurance arrangements and free quotations.

"With new wrapping and packing technology and no damage, furniture removal on rail in containers is safer than road," says Ray Hannan.

"It's also more economical to use rail. Road costs are going up so much that rail is now better priced for long distances."

Hannans pioneered the removal of furniture in standard containers around Australia. With the

ONE FURNITURE MOVING BUSINESS HAS KEPT AHEAD OF ITS RIVALS BY BASING ITS SERVICE ON RAIL.

Making the move: competition is tough in the interstate furniture moving business.

establishment of depots in all mainland state capitals in the 1960s, Hannans joined the official panel of removalists for the Department of Administrative Services and other government bodies.

For 32 years, G. Hannan and Sons has been the exclusive removalist for J. W. Parker, makers of the furniture that has won awards in all categories. A large proportion of Hannans' business is transporting new furniture from Australia's manufacturers to retailers in other states.

"We now move 200 containers of furniture a month interstate," says Ray Hannan. "It's so safe and simple that it's no wonder we're doubling our cubic capacity on rail every two years.

"We believe the time is not far distant when rail could be moving 250 furniture containers a week on the east coast intercapital routes.

"Our competitors are all moving our way, using more rail containers.

"We have more than 200 of our own containers and we also use the Railways of Australia Container Express (RACE) containers – and we can't get enough of them.

"In December-January alone, we moved 800 containers to and from Melbourne and Sydney."

Realising the advantage of sending containers interstate on rail, Hannans built a number of depots for the storage of full and empty furniture containers.

In the early days, there was a good deal of one-way movement out of Melbourne with containers returning empty. Nowadays, containers are back-loaded with furniture because of increasing demand for Hannans' services.

Although V/Line has special lightweight container rates and differential rates for empty returning containers, it always pays the big movers to keep their containers fully loaded. With furniture, there is a relatively well-balanced flow of freight into and out of the state capitals.

Hannans has been innovative in designing new ways of loading, unloading and handling containers. The company had exhibited its techniques at exhibitions overseas.

"Garnet Senior is still the mastermind," says Ray Hannan.

"He makes the bullets and we fire them.

"But the Superfreighter has been out biggest success story. Even the diehard roadies now admit that in the competition for more interstate freight, rail is calling the shots.

"I said one word makes all the difference between us and them, but it's actually one phrase: from V/Line with care."

ONE SPOT

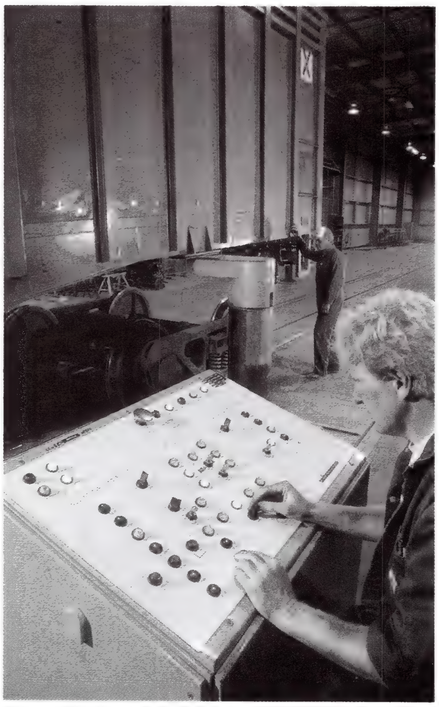
AN'S TOTAL-MAINTENANCE APPROACH TO REPAIRS PAYS OFF IN PRODUCTIVITY

The One Spot wagon repair facility at Dry Creek, with its hand-picked staff and high-speed repair time, has become a showpiece for Australian National. The facility is used for running repairs and modifications to AN's wagon fleet.

Three flying gangs supplement the main workshop. These mobile workshops and their crews travel to do repairs on loaded freight trains. Repairing the problem on site means keeping delays in the train's schedule to a minimum and avoids traffic congestion.

One Spot staff handle only running repairs, such as changing worn wheels, removing bogies and auto couplers, and servicing hitches. If a vehicle needs major repairs, it is diverted to the Islington workshops.

Discussion with unions and staff was an important factor in the planning and development of the One Spot. Thirty-seven staff are employed at the facility, compared with 94 on the old repair roads. There are 18 Wagon Repairers Class 1, 15 Wagon Repairers Class 2, two Leading Hand Wagon Repairers, and two Foremen. One Spot staff are all hand-picked and multiskilled. The non-tradesmen (Wagon Repairers Class 2) are trained to cope with all tasks except electric welding, fitting, and air-brake testing. The tradesmen, or Wagon Repairers Class 1, do all the trades work as well.



Dry Creek One Spot console operator operating the jacks lifting a wagon.

It takes One Spot staff an average of only 60 minutes to repair a vehicle. These 37 men put through 3 500 vehicles in the nine months from January to September 1988, and serviced 150 grain hoppers. Flying gangs also repaired almost 5 000 vehicles at locations throughout the metropolitan area.

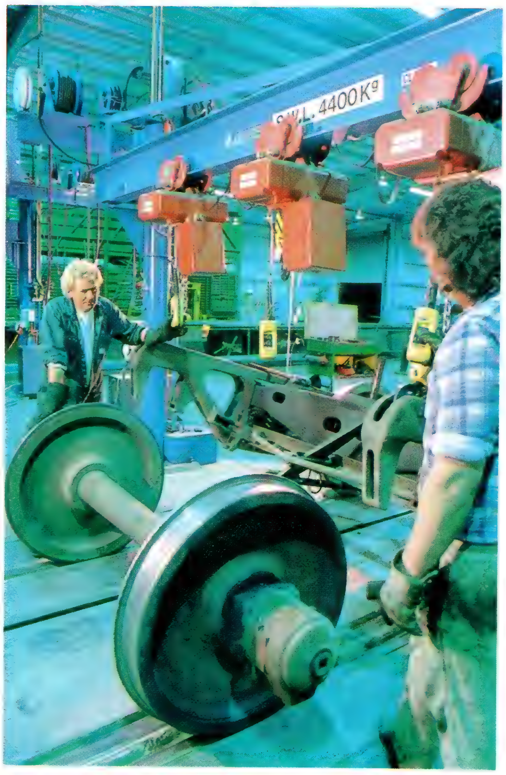
The large One Spot building has workshop facilities, a storeroom, air-brake repair section, supervisor's office, first-aid room, and staff amenities. Three tracks lead into the building from the inbound yard and out of the building to the outbound yard through electrically-operated steel roll-up doors.

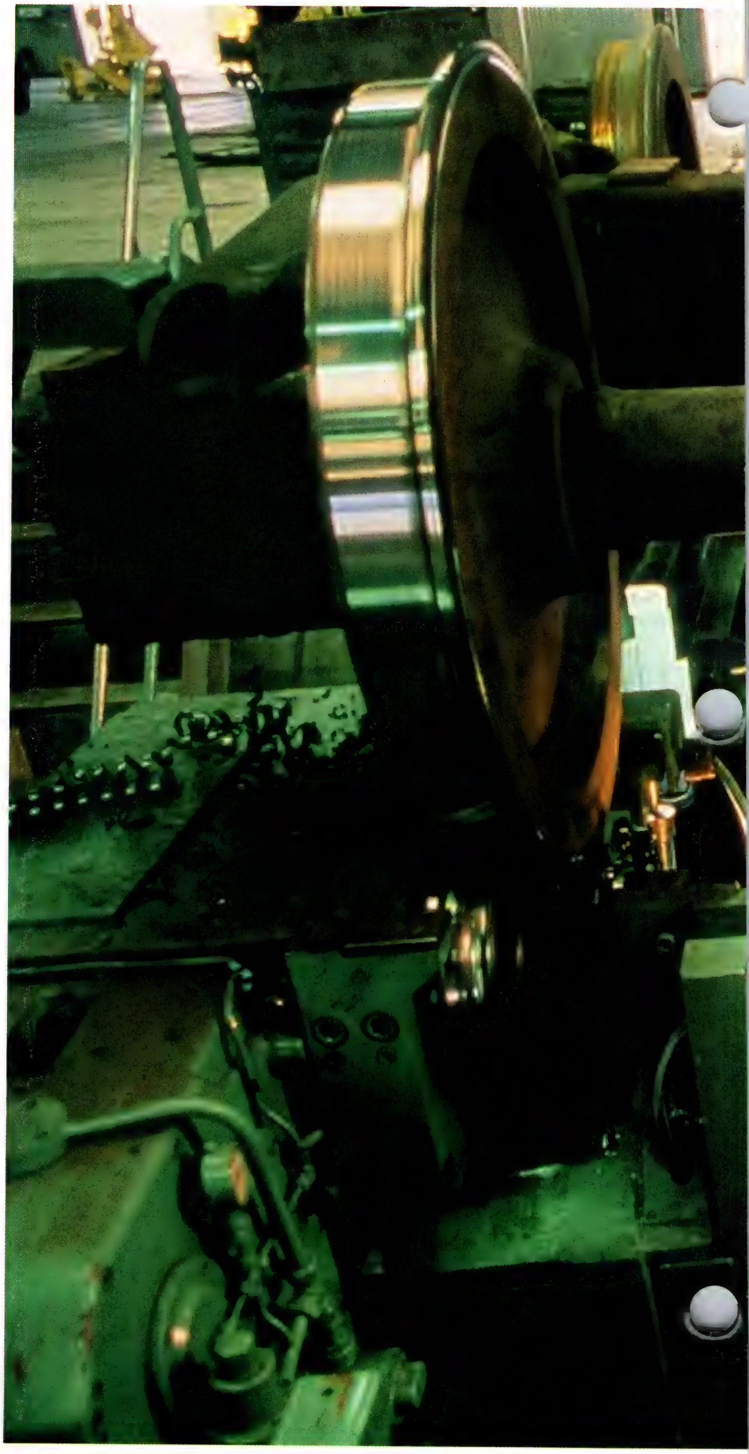
Each of the tracks inside the building has its "one spot", where all the equipment and materials needed by the Wagon Repairers are easily available. All the work is carried out at this one spot. Delays are reduced, as repairmen no longer have to waste time walking up and down the repair road, fetching and carrying equipment. A full range of stores and spares is kept.

The equipment at each spot consists of built-in 150-tonne jacks and two sets of hoists for the dismantling of bogies and other lifting tasks. Three hoists are mounted on a beam that swings across the track after the vehicle has been positioned. The hydraulic jacks are capable of lifting wagons in less than 60 seconds for removal of bogies. Reels for air, oxygen-acetylene, electric welder, and power are mounted to the jib crane columns.

A vehicle is sent to the One Spot after it has been found defective (green-carded) by a train examiner. It is brought to the inbound yard where a Leading Hand inspects the whole vehicle, noting anything else that needs fixing. He then runs a computer check to find out whether any modifications are outstanding.

All the work needed is carried out at the same time. This means that





Above: One Spot staff change the wheel set on a bogie.

Right: Wheels being reprofiled on the underfloor wheel lathe at AN's One Spot workshop.

Below: A Flying Gang repairs the handrails on a box car.

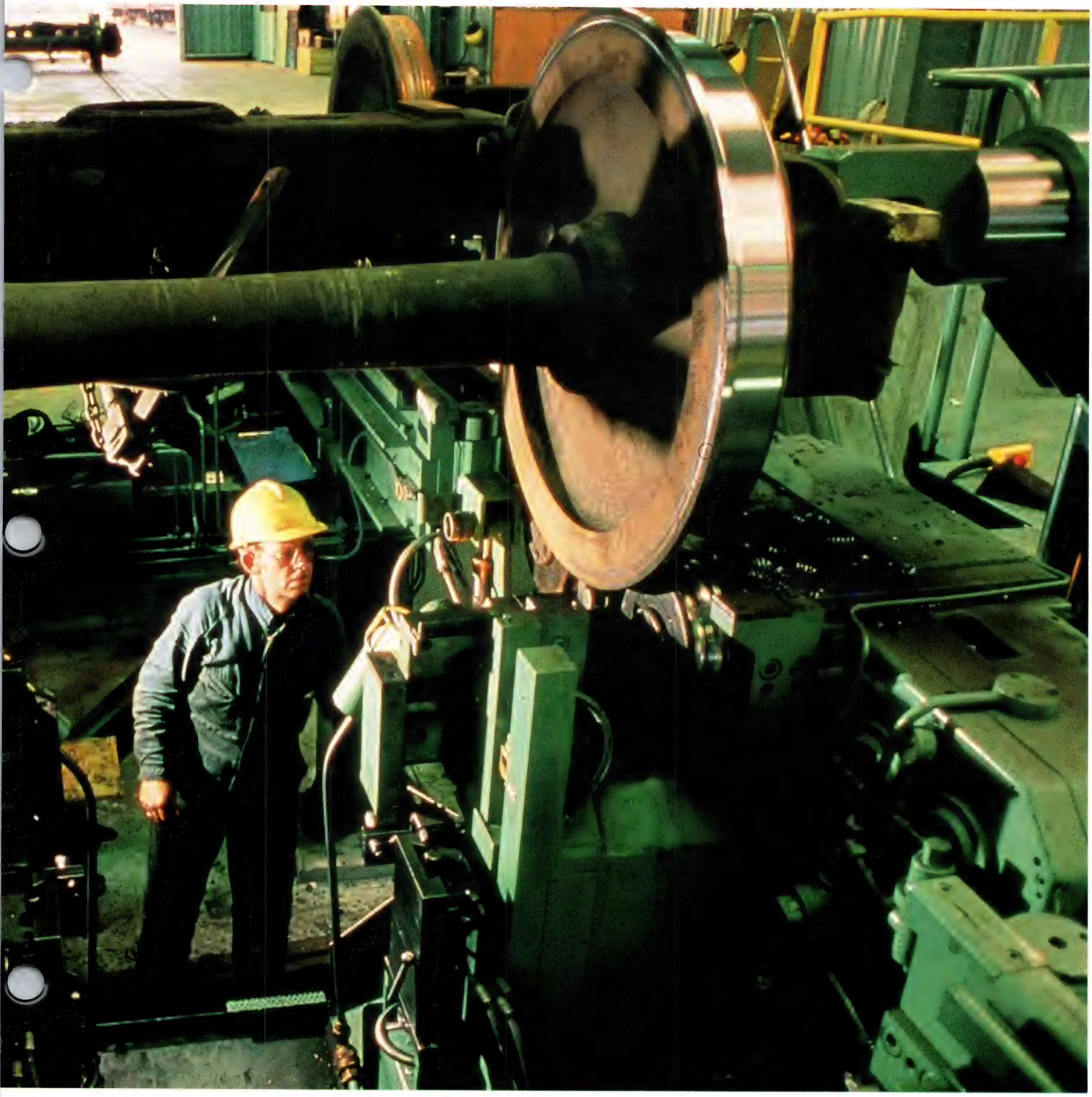
vehicles will be serviceable most of the time. In addition to time savings and increased vehicle productivity, there are substantial cost savings.

Once the preliminary inspection has been done, the vehicle is pulled into the One Spot by a winch and cable. A hook (called a "rabbit") at the end of a cable engages an axle of the closest vehicle and pulls it into the One Spot. Safety features are built into the winch controls. A 1 per cent upgrade slows the vehicle as it approaches the workshop building, and the rabbit stops automatically a short distance from the door.

A second rabbit pulls the vehicle into the building and to the work spot. Progression of wagons through the One Spot building is controlled from the panel next to the tracks.

In addition to running repairs, One Spot staff carry out modifications to rolling stock such as alterations to steps and handrails, twistlocks, and hitches. Many modifications are to meet customers' requirements. The coal wagon fleet, for example, was modified to increase load capacity. One Spot staff added spillage boards to 180 wagons in three days.

When work on a vehicle is finished, it is moved to the air-brake position, where the brakes are tested. It then goes out of a door at the southern side of a workshop and rolled slowly down the slope to the outbound tracks. Vehicles are back in traffic as soon as they are ready – quite a change from the days when they were trapped in the dead-end repair road until shunting could be done. This was usually done after hours, when work staff were out of the way. Work at the One Spot never has to stop,



even during shunting.

An addition to the original One Spot plan is the wheel lathe. This Hegenscheidt lathe is believed to be the only underfloor wheel lathe in the world capable of handling dual gauge. It was set up in Port Augusta in 1972. Before it was moved to Dry Creek in January 1988, broad-gauge locomotive bogies had to be dismantled at Mile End and wheel sets sent to the wheel shops at Islington for reprofiling. Reprofiling locomotive and passenger car bogies without removing them from the vehicle is quieter and cheaper.

The lathe was overhauled and modified to handle both standard and broad gauge bogies before it was installed in the One Spot facility.

One Spot staff are motivated, highly skilled, innovative, and working to their full potential. They work quickly without any lowering of standards, and the workshop is efficient in that vehicles are back in use immediately repairs have been completed. Although additional work means a longer time in the One Spot, the total-maintenance approach to vehicle repair is more efficient in the long run because it cuts down the total time a vehicle is not earning money.

The result is more for less: a small number of staff is performing better, increased wagon availability means that fewer wagons are needed, and modifications to vehicles enable them to travel faster and with greater payloads. There are widespread effects on total AN productivity, all at lower overall cost.

Tray of AN's tool carousel: Saves space, ends injuries and avoids costly delays.

CAROUSEL IS A WINNER

Australian National's new vertical carousel storage facility, designed by AN staff and the fifth largest in the world, enables employees to lay their hands on any one of 4000 items in seconds.

Workers no longer have to climb ladders, walk down long corridors, or delve into cabinets.

The carousel is simple to operate. The storeman enters the wanted items number into a computer, the carousel mechanism is automatically set in motion, and the tray containing the item is moved to the bench by the shortest route.

Apart from the ease of operation and time saved, the carousel has other benefits.

- There is no risk of industrial accidents, such as people falling from ladders or injuring themselves while moving heavy objects.
- An automatic cut-off device is an additional safety feature.
- An employee in a hurry cannot accidentally take the wrong item, something which means costly delays if it is sent to a remote location.
- The carousel takes up only about 20 per cent of the space otherwise required to store the same items.
- Security is simple. The key and computer disks are removed, and no-one can get into the carousel.

The carousel should last quite some time: the estimated life of the first major part expected to wear out is 92 years.

QR SELLING ITS EXPERTISE OVERSEAS

Queensland Railways Consulting Services are providing expert advice to governments, railways and transport organisations in China, Thailand, Sarawak and Kenya.

The consulting services have developed from the wide knowledge the rail system has gained in its recently completed upgrading and electrification of 2500km of Queensland's rail network.

- In Sarawak, QR's consultants are advising the John Holland Group, who are involved in building a mine logging railway. Queensland Railways is providing the initial planning and estimating of rollingstock materials and construction methods.
- In Thailand, QR is doing a study of the driver training requirements of the Thai State Railway, including the possible need for a driving simulator.
- In China, the Chinese Ministry of Railways is being helped to develop cost-effective solutions to locomotive driver training needs.
- In Kenya, QR is providing 93 class locomotive expertise to the Kenyan Railways.
- In New Zealand, consultants are providing advice on technology transfers involving high rail equipment.

Queensland Railways is also assisting a number of Australian joint venture organisations in the preparation of tenders for low-cost signalling schemes in Thailand.

THE ELEMENTS OF DANGER

The elements pose a constant threat to railways but not all the natural disaster detection equipment available can replace the reactions of the trained and vigilant rail worker.

The Ancient Greeks believed the world was made up of four elements: earth, air, fire, and water. And they accepted that sometimes these elements were hostile.

Over some 153 years, all four elements have thrown their worst at the railways, causing innumerable accidents, some so serious as to be woven into regional folklore, some avoidable, some less so.

Purists will say that no accident to a train caused by slides, gales, bushfire or flood is truly unavoidable. Near-perfection in design, maintenance, patrolling, communications and hazard detection equipment can and have prevented accidents in this "elemental" category. For example, the Shinkansen lines in Japan are laid in a country beset by typhoons and earthquakes – yet in more than 20 years and millions of train movements they have never lost a train. The pessimist might add "not yet", but the Australian railway engineer would confirm that Shinkansen safety approaches perfection.

But not all railways can justify the elaborate protection arrangements of these exceptionally busy and, compared with complete rail networks, relatively short superspeed lines. And there is a practical limit to what can be done. You can detect rockfalls with wire loops and floods with flood gauges, linking both into a failsafe signal system that will usually detect rupture of the track by, for example, a flood dropping a bridge into the river. But how do you detect the embankment or culvert that collapses right *under* the train? Or the culvert that washes out, leaving the rails in mid-air? Or the bridge that is hit by flood debris and is merely knocked out of alignment enough to derail a train? How do you detect the bushfire-weakened timber trestle or the freak wind gust that hits a three-tier motor car carrier carrier broadside-on?

The answer, of course, is that you will detect only some of those "elemental" threats and then only with great difficulty. Usually it will be done less by gadget than as a result of intervention by an alert, dedicated human sensitive to danger and able to report it in time. The Sharp Lookout insisted upon by the Rule Book and the driver's valve of the automatic brake have saved far more trains than the fanciest natural disaster detection equipment.

ENGINEERING. It is often forgotten that the earthworks on a road or railway are exactly that – works. They are engineering structures, disturbances by man to nature. Nature's original surface is itself sometimes unstable and often unable to bear the load of a heavy train without substantial preparation.

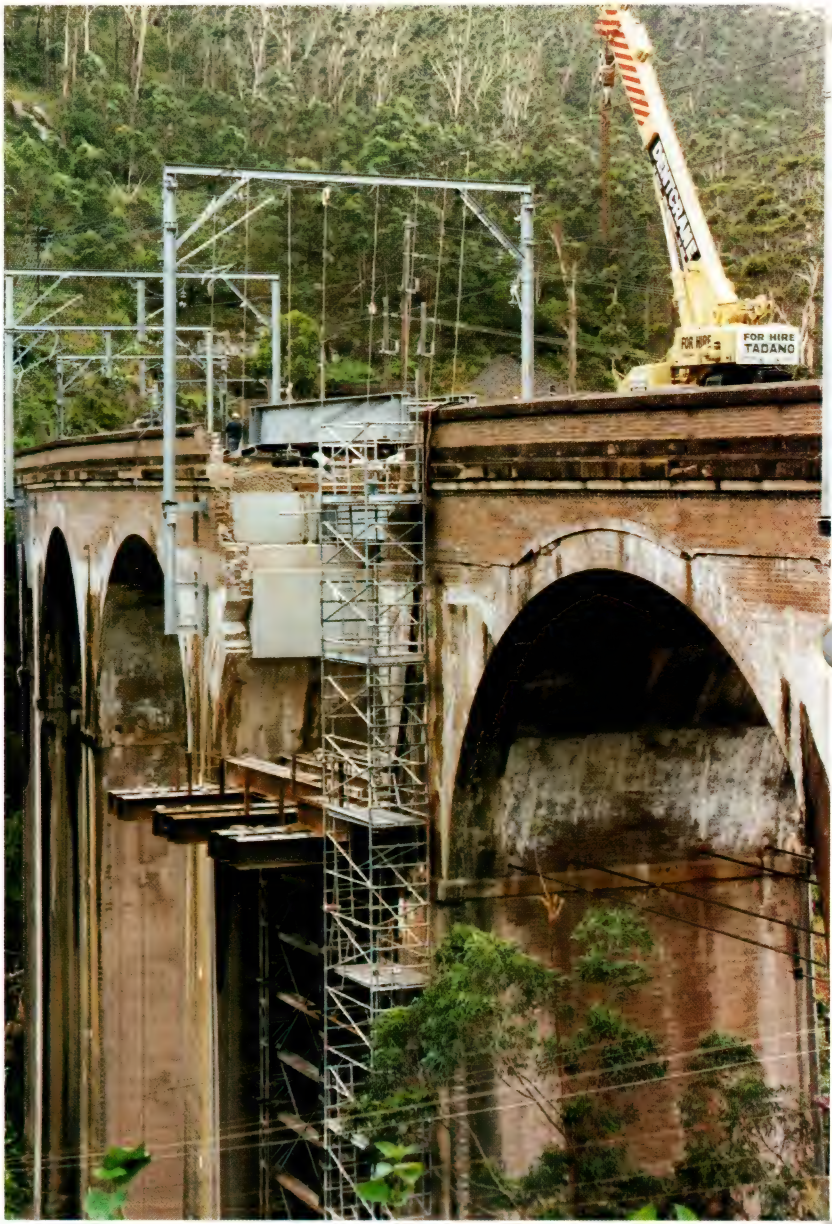
Today this modification is known as the engineering science of soil mechanics, and the construction of earthworks is a much more precise business than the apparent muddle of bulldozers and scrapers on a muddy construction site suggests. The geology – its bedrock, soils, slip planes and drainage – is studied carefuly. Cuttings (cuts) will be sloped, benched, and drained to take this into account. Embankments (fills) will be carefully built up from selected layers of material, often premixed. Each will be placed, rolled and compacted. Watering is a normal part of this. Special geotextile fabrics may be built into the structure between layers, or overlaid and sprayed with binder emulsions to achieve the right stability or to curb erosion. We have learned much from the highway engineers. Some of our railway engineers have even learned to leave tidy linesides that match the highway engineer's environmental sensitivity.

In the bad old days, earthworks were never so good. Cuttings were driven through bedrock, leaving soft soil overlaid on slope planes running towards the track, ready to slide with the first really hard rain. New lines were operated under freight traffic alone, so that their embankments could settle before passenger traffic was allowed at express speed. When they slipped, cutting works were dug out or shored with brick retaining walls; embankment slides were corrected by tipping yet more soft uncompacted fill. Gentle sinkages were made good by dumping ballast and lifting the track, which, given the cost of ballast, has always been an expensive solution.

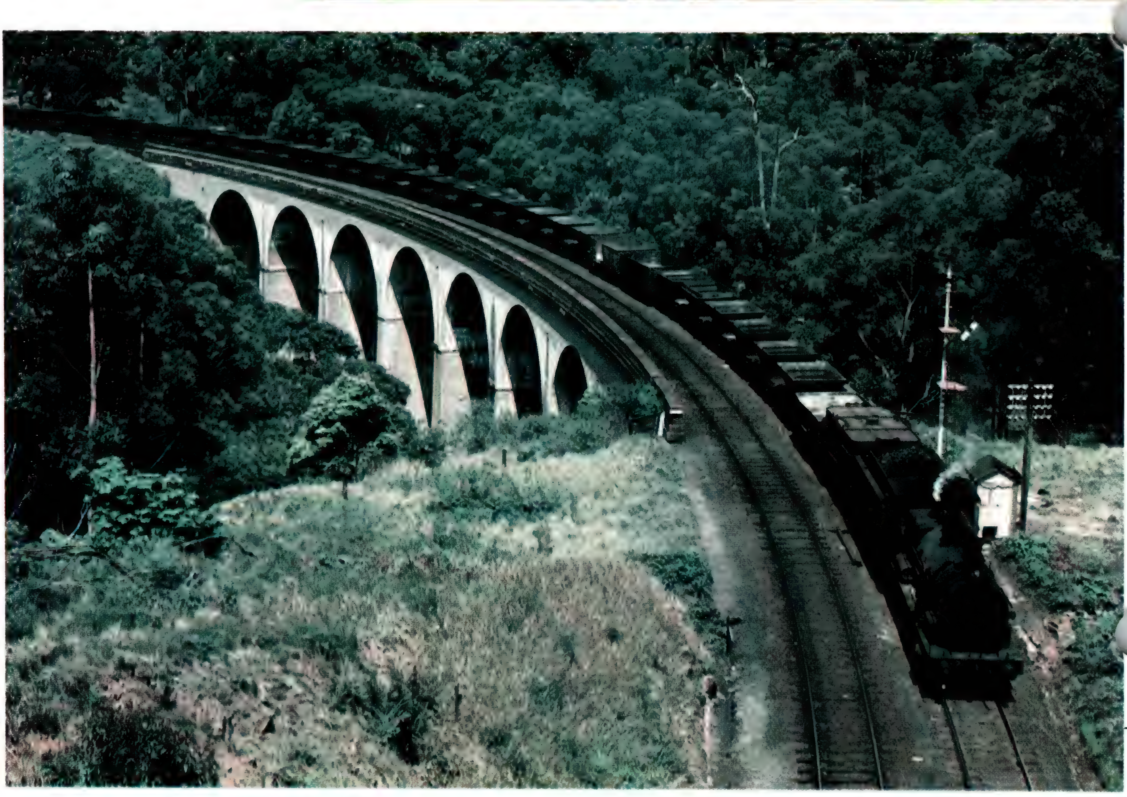
Failures of these unscientific earthworks soon occurred and, when undetected by humans, they caused serious moving-train accidents.

Perhaps the earliest recorded land slip accident was in the much photographed Sonning Cutting, near Reading on the first section of Isambard Kingdom Brunel's 2130mm (7ft) gauge Great Western Railway. Around 5.30am on the frozen Christmas Eve of 1841, a down mixed train crashed into an earth slip. Eight people were killed and 17 hurt, most of them poor frozen wretches who had been huddled on the plank seats of the open low-sided wagons that were the lowest class of travel in those hard days.

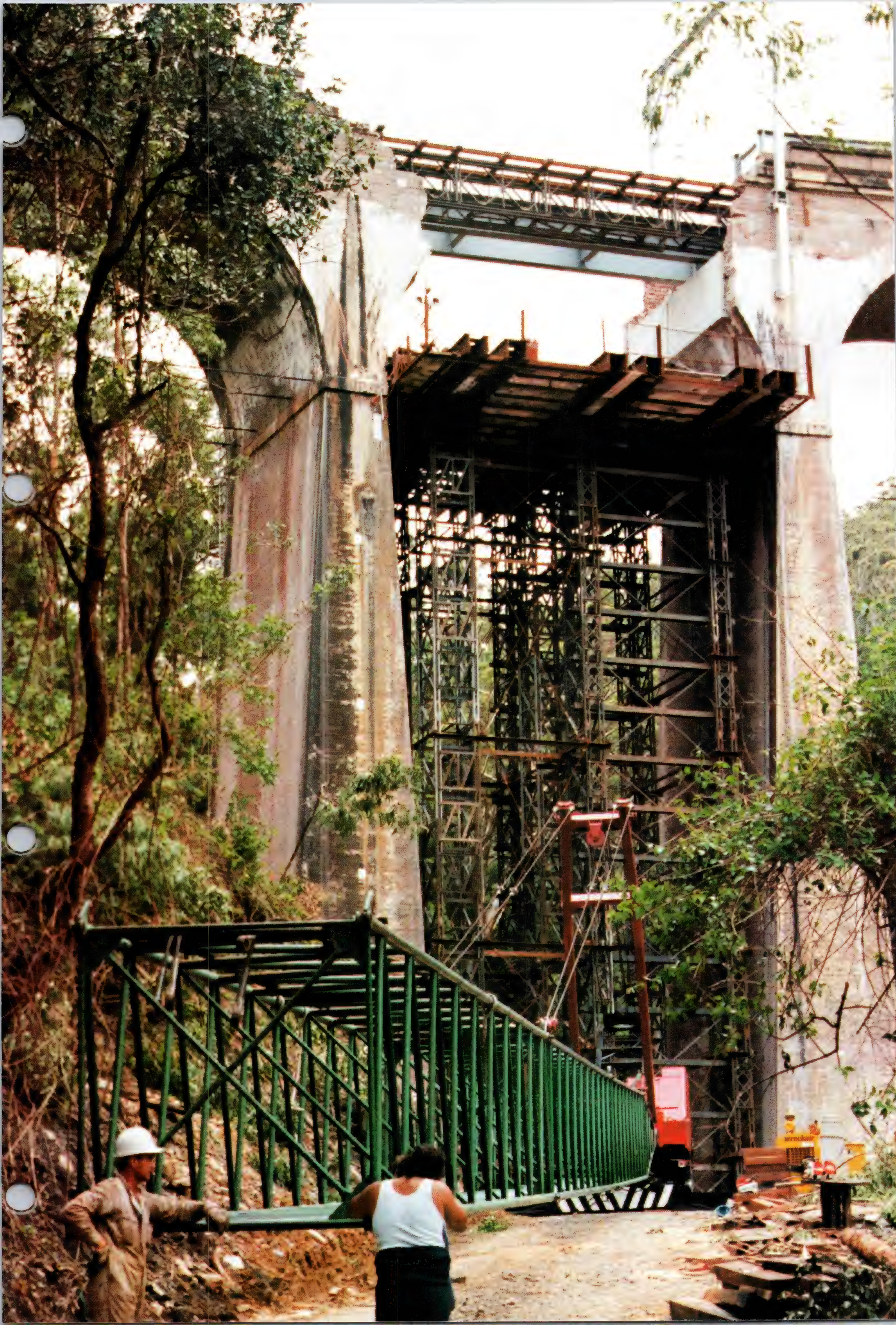
The Board of Trade inspectors investigated under Mr Gladstone's first Regulation of Railway Act of the previous year, noted the gentle 2:1 slope of the cutting, and reported in a manner kind to the GWR and the great Isambard.



Opposite and above: Working against the clock on a vital Stanwell Park viaduct in New South Wales.



Right: The graceful Stanwell Park (N.S.W.) viaduct in happier days. A NSW GR "standard goods" engine heads towards Sydney with a load of coal — 1958.


wreckair

WORST SLIP. England's worst earthslip disaster was on the Midland Railway's Settle and Carlisle line. It had been surveyed over the bleak moors and fells by a young Tasmanian called Charles Sharland. The job broke his health, for he died at age 26 before the line was opened in 1876 as the last of the three great Anglo-Scottish main lines.

On the winter afternoon of 19 January 1916, in the Long Meg cutting near Little Salkeld, a snap thaw caused a landslip less than five minutes after the line had been patrolled. The Midland Scottish Express from London to Glasgow was pounding down the 1 in 132 gradient at 110km/h. It crashed into the slip, tipping 4-4-0 compound engine 1010 on to its side, and telescoping two of the gaslit wooden cars into the tender. Fortunately, there was no fire (unlike two previous Midland wrecks on this line), but seven people died.

The New Zealand Railways were less lucky in the early morning of 6 July 1920, near Ongarue. The Auckland to Wellington Limited Express, hauled by an engine with a less than brilliant acetylene headlight, ran into a large cutting slip of *papa,* a volcanic soil that can be carved like rock when dry, but that is exceptionally unstable when wet. The slip contained a large boulder. The engine went over and three gaslit wooden car telescoped. Gas ignited and the car burned until a second *papa* slip put the fire out. Seventeen passengers died and the Ongarue disaster led to a general conversion of all NZR locomotives and coaches to electric light.

The Napier Express derailment of 22 September 1925 burned five more wrecked gaslit cars, and kicked the electric lighting programme along, to the relief of politicians and the public, and the profit of the American Pyle National Company and J. Stone and Co, who supplied the loco and coach lighting equipment.

THE ROCKFISH LANDSLIDE ILLUSTRATES HOW QUICKLY EVEN A MODEST EARTHSLIP WILL STOP A TRAIN.

ROCKFISH. A more typical and recent landslide accident involved a modern all-stainless-steel train, the successor to the Southern Railway's famous Washington-New Orleans Southern Crescent. At 5.20am on 13 April 1983, Amtrak Train 820, The Crescent, had rounded a curve in a cutting near Rockfish, Virginia, at 77km/h when the driver saw a shadow 70m in front of the train. The two GM diesels hit a landslip, derailed, jackknifed and piled up four of the six cars behind them. As usual, modern couplers and strong structures saved the day. Nobody was killed. But 24 of 331 people aboard were hurt, and there was $US232 000 worth of damage.

The cutting had been made for single track in 1860, to a 1:1.5 wall slope through a phyllite rock. In 1919, it was widened for a second track, which was lifted when CTC was put in in 1960. The slip was not large, only 76 cubic metres of sandy loam and silt, with 18 per cent water. The maximum depth over rails was well below coupler height – just 600mm. The cut had no record of instability, and it had been patrolled only six hours earlier.

An explicable event? Or was it?

The vegetation had been weakend by burning off, and there was ample warning of an instability problem from trees tilted ominously towards the track. The accident was at milepost 135.2. Just 14 months before, just one kilometre away at milepost 135.9, the same Amtrak 820 had derailed on a mudslide in a cutting with a similar geology, slope, and history of natural vegetation clearance by burning.

Rockfish illustrated how quickly a train (or at least its locomotive) will stop when it runs into an even modest earthslip. But how much soft earth and mud does it take to derail a train without actually stopping it? The answer, once again, is a lot less than most railwaymen believe, which highlights the vital importance to safety of keeping flangeways clear and unobstructed.

At a rural level crossing near Hackettstown, New Jersey, heavy rain on 16 June 1925 washed some of the road's pavement formation over the Lackwanna Railroad's track. The material was soft mud, its depth only a few centimetres. This was insufficient to derail the driving wheels of a passing Pacific Locomotive. But the leading truck wheels were derailed, and 50 metres beyond the road crossing there was a turnout to a disused siding. The engine came off at the frog (crossing) of this turnout and ran down a bank, dragging two coaches and two Pullman sleepers of a special boat train excursion service beside it and on to it. It was then that the big Pacific's boiler ruptured. This turned a bad shake-up into a disaster in which 50 people died. The boat was the Republic and the White Star Line thoughtfully held her sailing for the survivors to make their connection.

WHAT TO DO? Control of the landslip hazard is a difficult problem for the district engineer who has inherited kilometres of unstable earthworks, badly built decades before. What can be done? First, careful, case-by-case analysis of the local geology, soil and slip planes. Local drainage works, slope easing and benching can help if there is room. Cement injection can help; the writer recalls it being done 40 years ago on a soft embankment in Sydney that still gives trouble. In some cases, the only solution is to build a concrete crib or a stout retaining wall.

All of this is very expensive work, earning not a cent of extra revenue for the railway. But when passengers or dangerous goods are carried, it is work that is the unavoidable price of safety.

The landslip accident reports, of course, cover the slips that caught a train because they were not detected in time. For every one of these accidents, there are hundreds of slip incidents, minor and major, that were not allowed to grow into accidents. These were caught by observant "eyes-up" patrolling of the cuttings, and by people who climbed off their trolley to inspect the banks and culverts below the line. Accidents were avoided by people armed with local knowledge, the training to look for the indicators of danger, common sense, and a dedication to safety. There are few outdoor jobs on the railway that are less exciting and less glamorous than checking weed-covered earthworks that have probably been there for a hundred years. And few jobs are more unpleasant in wet weather. Yet few jobs are more necessary for the safety of the line.

ROCKFALLS. The walls of a cut through hard rock will usually be stable, even though exposed rock will weather and break up from the effects of wind, rain and ice. The risks from small pieces of rock dislodging and falling on to the track are small and often they shatter on hitting the ballast or rails. The chances of them falling on a train are small, and of serious damage smaller still.

The real problems arise in places with unstable geology, or large areas of rock that weather rapidly. Where the size and frequency of rockfalls cause anxiety, it is usual to protect the line with an automatic signal of some kind. A fence-like installation is common, with a series of light horizontal wires, typically 200-300mm apart, set on stout posts about 2m high, beside or above the track. The wires are connected in series. In the early days, the connection was mechanical via return pulleys; today it is electrical. Both operate so that a falling rock breaks at least one wire and sets the signal to danger. This works well, provided that the fall does not occur while the train is actually passing.

No Australian installations to detect rockfall are known, but visitors to Scotland can see one in the Pass of Brander on the former Caledonian Railway's Callandar and Oban line. Here the track follows the slope of Cruachan. This installation has generally given its warning in time – except in August 1946 when a large boulder fell on the track just in front of the 6.05am Oban-Glasgow express. With vacuum brakes applied in emergency, the engine crashed into it; lacking a cowcatcher, the locomotive lifted over the boulder and derailed itself, the tender and several coaches. Fortunately, nobody was hurt, for all-steel cars and strong couplers were not the norm in Britain at the time.

FEW RAIL JOBS ARE LESS GLAMOROUS THAN CHECKING ANCIENT EARTHWORKS. YET FEW ARE MORE NECESSARY FOR RAIL SAFETY.

Where major falls are a serious threat to the safety of the line, substantial protective rockfall shelters must be built over the track. Built in timber or steel, with an earth overlayer several metres thick, and today in reinforced concrete, these shelters function in exactly the same way as Swiss avalanche shelters on mountainsides. Rockfall shelters over track and tunnel entrances are rare in Australia, but examples can be seen on the steep 1 in 30 descent from Robertson to Unanderra on the Illawarra escarpment railway in New South Wales.

MOVEMENTS. The heaviest earth movement is of course the earthquake, many of which have severely damaged railways. While no railway disaster due to earthquake is on record, railways in danger zones have been built, and alarmed, to cope with severe earthquake shocks. In Japan, the Shinkansen high speed lines and the major subway stations in Tokyo are earthquake resistant. So, it is said, is the Seikan Tunnel, at 53km long and 200m below sea level, the world's longest and deepest; it cuts across an earthquake fault. So does BART, the Bay Area Rapid Transit system in San Francisco, where the Market Street subway runs right along the San Andreas fault – the fault that is predicted to again devastate San Francisco. BART's Transbay tube is also earthquake-resistant. In New Zealand, the new Rangitiki River bridges on the diverted North Island Main Trunk have their piers on and span a fault line. Of major Australian cities, only Adelaide is said to have any significant earthquake risk. In the unlikely event of this happening, repair and resupply roles for the railways have been built into the Australian government's national disaster planning.

SUBSIDENCE. Mine subsidence is a railway problem quite close to home. But we have not seen anything remotely like the events on the Furness Railway at Lindal in England on 22 September 1892. Locomotive No 115, a Sharp Stewart 0-6-0, was minding its own business shunting wagons on colliery sidings when, without warning, subsidence created a funnel-shaped hole. No 115 rolled in, breaking fishplate bolts and rails. Fortunately, the engine sank without its crew. The railway company saved its tender, but FR No 115 went down hundreds of feet throught the loose earth and coal waste to become a total loss. It is still there. History does not record who bore the costs.

In New South Wales, the Illawarra escarpment is honeycombed with old coal workings dating back to 1857. Many galleries were neither properly surveyed nor the mining work documented. Such conditions apparently exist in the Stanwell Park area, where an elegant and much photographed eight-arch brick viaduct 148m long and 45m

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high set on a 240m radius curve was built in 1919 to deviate the Illawarra main line.

For 65 years the viaduct stood firm in its sylvan setting, until cracking was noted in the floor of arch 3 on 14 August 1985. It was repaired by strengthening the area of the failure, and the structure was very carefully watched by State Rail's civil engineers.

On 8 December the up track was closed due to "loss of brickwork in the arch of another span", an SRA euphemism meaning that the span was starting to fall down. On 12 December 1985, just days before the opening of the Illawarra Line, both electrification, viaduct and line were closed. The remarks of the then chief executive, David Hill, and NSW Premier Neville Wran on being told of this most unfortunate timing are not recorded.

The challenge facing the SRA was to identify and fix an unidentified structural problem on a vital coal-export and Sydney commuter railway with no plans, materials or information available, and with manufacturers and contractors shutting down for the Christmas holidays. The job was done with an exceptional level of dedication and engineering skill by constructing a piled trestle falsework under the faulty arch and dismantling it while under compression – the first known exercise of its kind. The failed span was replaced with a new steel and concrete deck slab structure.

The repaired bridge was opened on 4 February 1986, but the structure has moved again since then. It is being carefully monitored, and major rebuilding or replacement will be needed.

THE SRA REPAIRED THE FAULTY ARCH BY DISMANTLING IT UNDER COMPRESSION, THE FIRST KNOWN EXERCISE OF THIS KIND.

HAWKESBURY. Another form of movement underground forced the urgent and premature replacement of the original Hawkesbury River Bridge, the longest in NSW, during World War Two.

The original double track structure, built by Union Bridge of New York and opened on 1 May 1889, was the third largest in the world at the time. Its piers, then the world's deepest, went down to 49m below water level, to what was believed to be solid rock. But in 1939, on the eve of the war, routine surveys found that one of the piers was tilting out of the vertical. It had been founded not on the rock underbed of the river but on a gigantic, boulder-like rock resting in a pocket of that bed. The bridge could not be closed, for there was a war on, and the Sydney-Newcastle line was not only the busiest intercity route in NSW, but a vital strategic link. It could not be repaired, for that too would involve closure to build two new piers and a long span to replace the two spans on either side of the defective pier and its "floating" foundation.

So the NSWGR had to build a completely new bridge – and to do it in wartime, at the worst possible time for materials and skilled labour. The job was handled by the NSW Railways themselves and opened in early 1946. Throughout the war, the two tracks on the old span were singled on the "high" side of the tilt and the trains kept to a 7km/h crawl over an increasingly defective bridge.

With the old Hawkesbury Bridge, the old NSWGR was very careful, and perhaps a bit lucky, not to create the world's worst rail accident caused by earth movement. That was to occur not in the open air or on a bridge but in a tunnel.

On 17 June 1972, near Vierzy on the Paris Nord-Soissons outer suburban line, subterranean earth and rock movement brought down the roof lining of a tunnel. Into this crashed in rapid succession not one but two speeding diesel passenger trains. The impacts brought more rubble down on top of the wreckage, extending the area of the collapse. After five days' digging by volunteers, who worked under appalling conditions with further falls, the final count was made: 107 people lost.

Dangerous stuff, earth, an element to be kept in its place and watched very carefully – especially when it rains.

WIND HAZARDS. Winds above 30km/h will exert increasing severe lateral pressures on exposed surfaces, creating high sideways loads on bridge girders and toppling moments on piers. Similar overturning moments and lateral forces are generated on rolling stock. The pressure varies with the square of the wind velocity, and the inclination, area, and aerodynamics of the structure.

The worst railway bridge disaster solely attributable to wind loading is well-documented: the collapse on 28 December 1879 at Dundee, Scotland, of the 13 high girders of first Tay Bridge into the Firth of Tay. They fell when the evening northbound mail train from Burntisland (Burntisland is more or less opposite Edinburgh on the north side of the Firth of Forth) presented a form of sail to the wind, enough to tip the final balance in a particular heavy gust.

The inquiry found that the first Tay Bridge had been badly designed, with no allowance at all for lateral wind loading. It had also been badly built, with gimcrack pier castings containing holes plugged with beeswax and painted over, and badly maintained, with loose bolts and broken lugs for which there were no proper inspection, reporting and repair procedures. Around 82 lives were lost, the number arrived at by counting collected tickets, for nobody knew how many people were aboard. The newly knighted engineer Sir Thomas Bouch was held responsible, and the event was immortalised by a local poet named McGonigal in some of the worst verse ever written in English, and in one of the best novels, Hatters Castle, by A J Cronin.

THE NSW RAILWAYS HAD TO BUILD A NEW BRIDGE IN WARTIME WHILE TRAINS KEPT TO A CRAWL OVER THE INCREASINGLY DEFECTIVE OLD ONE.

SURPRISING. In the early days of the American railways there were bridge disasters aplenty, several much worse than the Tay. But no large-scale American accident seems to be attributed to a bridge being blown down. This is surprising, given the large number of high and exposed timber trestles structures over deep ravines. Indeed, one 1867 report of such a trestle on a transcontinent route said it swayed so much under the trains that it had to be steadied by lateral guy ropes.

In the earlier days, however, the wind did cause one of America's more exotic bridge falls, at Spuyten Duyvil, New York, on 14 January 1856. At low tide, the wind drove broken ice across the frozen Hudson and piled it under the Spuyten Duyvil bridge. When the tide rose, the floating ice lifted one span off the bridge and displaced it. The first train to appear was a double-headed mail (yes, double-heading was needed even on Sundays way back in 1856). The pilot engine got over safely, but the train engine and three cars were dropped into cold shallow water, killing two enginemen. Ice drift is one form of wind hazard that need not concern Australian railways – but what if the ice had been a empty barge?

Stability in high lateral winds was one of the reasons why military engineers recommended the 1676mm (5ft 6in) broad gauge for all strategic railways in India. But it seems that standard, medium and even narrow-gauge trains are really quite hard to blow off the rails. The main exceptions have involved narrow-gauge equipment in very exposed positions. On the North Island of New Zealand, palisades were put up to protect trains after one was blown off the old Fell system incline up the Rimutaka Ranges, north-west of windy Wellington. On the Midland Line from Christchurch to Greymouth on the South Island, steel palisades still protect the trains crossing the great high steel viaduct near Staircase (see picture on page 61 of April-May 1988 Network).

On the 914mm gauge Burtonport Extension line of the Londonderry and Lough Swilly Railway in County Donegal, Eire, since closed, a train was blown off the rails on the relatively low but exposed Owencarrow viaduct on 30 January 1925. One car went over the edge, costing four lives.

MAJOR HAZARD. But it is not necessary for the wind to drop a bridge or derail a vehicle to create a major railway hazard. Ill-secured parked wagons have been caught by gusts of wind and blown into motion. And on lines without siding trap points or scotch blocks, this can create a full-scale main-line collision hazard.

Lest anyone think that the trap points common in Australia would prevent these high jinks, consider what happened on the sidings at Chelford, Cheshire, on the London and North Western Railway on 22 December 1894.

The wind blew a high-sided wagon into motion, causing a violent collision with other wagons being shunted. This collision derailed them, and the pile-up fouled the loading gauge of the up main line just before the arrival of the double-headed 16.15 express from Manchester to Crewe. The pile-up demolished the wagons, the express and the signalbox in front of the signalman, who, like a good railwayman, stuck to his post to morse out the "Obstruction Danger". Fourteen people were killed.

On 27 March 1884 a string of loaded boxcars parked at Akron, Colorado, were blown into motion eastwards down the Burlington Company's main line. The telegraph wires hummed and the single track was cleared as the unmanned engineless train bounded along the main line, clattering over the points, through the stations, and passing trains, duly flagged through by an astonished railway staff.

Finally, at Benkelman, Nebraska, an engine was found pointing the right way and despatched to chase the blowaways. Eight kilometres further east, it coupled-up on the move and slowed the errant boxcars to a safe stop. The wind had blown them across the prairie for 154km or in Australian terms, half-way from Melbourne to Albury.

This is something worth remembering, we suggest, when wondering whether to tighten-up that handbrake one more click of the ratchet.

IN THE NEXT ISSUE

BUSHFIRE AND FLOOD

RIDING ON THE RESO

For more than three decades, rail reigned supreme in spreading the word of Australia's valuable resources

By Ian Hammond

The sight of 16 identical open touring cars and three support vehicles bearing the name of Victorian Railways trundling sedately across the plains of far northern South Australia in 1927 must have amazed stockmen. VR running cars and trucks to Alice Springs?

The vast centre of Australia had been settled, but it was still a remote wilderness to most Australians. That the cars' passengers were dressed for the city testified to their knowledge of outback travelling conditions.

Railways had not reached the centre, despite efforts dating back 50 years. The main freight transporter was the camel and would be so until the arrival of the Central Australian Railway in Alice Springs in 1929.

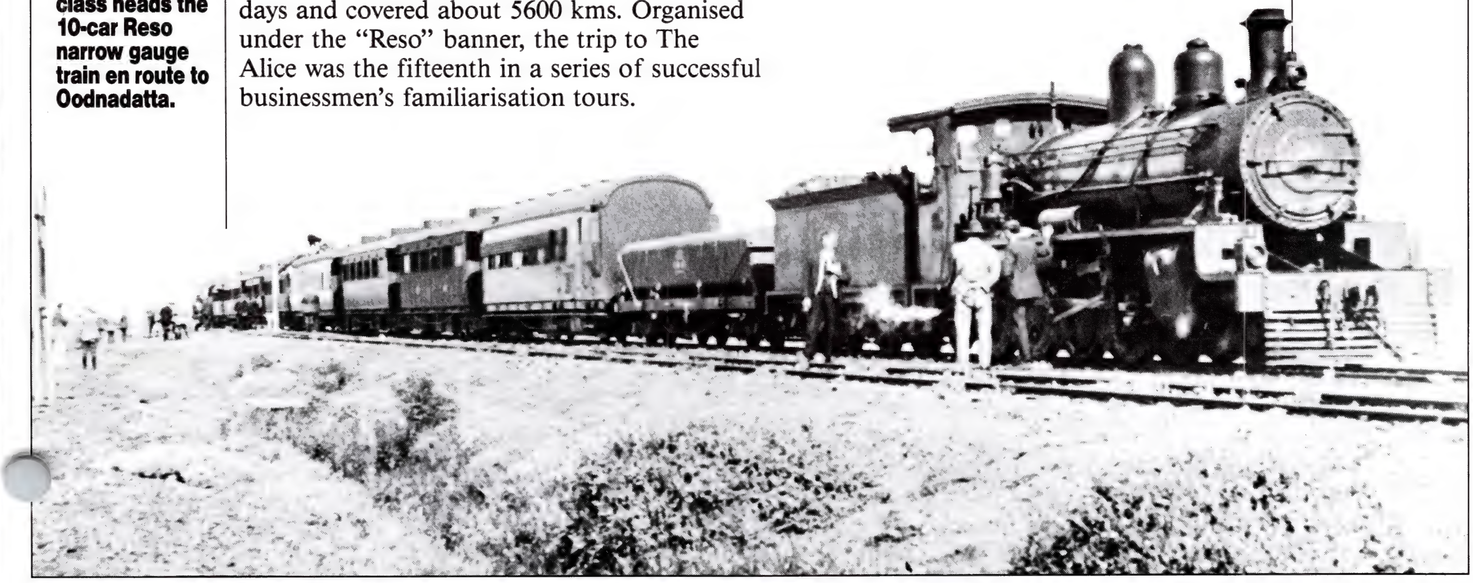
That fleet of northbound cars was the most ambitious tour ever planned by VR — a rail and road journey by 60 people from Melbourne to the Red Centre that took 16 days and covered about 5600 kms. Organised under the "Reso" banner, the trip to The Alice was the fifteenth in a series of successful businessmen's familiarisation tours.

Reso was the abbreviation of the Victorian National Resources Development Train, a scheme thought up by the VR Commissioners to show at first hand the resources and development of Victoria. The aim was to foster a spirit of co-operation and mutual understanding between the different interests in the state and to promote prosperity.

When in August 1922 VR ran its first Reso train, a tradition began that would last for more than 30 years and have implications far beyond the railways.

The story of the 15th Reso train merits telling, not only for the classy trains and railway co-operation that it displays but also because of the military precision of travel arrangements that incorporated trains, trucks, cars, camels, donkeys — and an aeroplane.

Water stop: NM class heads the 10-car Reso narrow gauge train en route to Oodnadatta.



FIRST TRAIN. The first Reso train ran in August 1922 to the Mallee and irrigated districts along the north-western part of the Murray in Victoria. It appears that there was some initial reluctance by businessmen to endure the discomfort of rail travel over long distances in distant parts of the state. The response from VR was: "We are providing a travelling hotel to which no-one can take exception."

The VR magazine of March 1924 said the first four tours were mainly undertaken by men from Melbourne anxious to know what our country was like. It was on the fourth tour, to the Western District in October 1923, that rural people of the seaboard towns expressed a desire to see their hinterland. A train from the Western District was organised to run to the Mallee area and Mildura in March 1924.

With so many successful Reso trips behind them, VR Commissioners decided that many Australians would be glad of a chance to learn something at first hand about inland Australia. They weren't wrong. The response proved that Australians were only too eager to find out more about their own country.

THE response proved that Australians were only too keen to find out more about their country.

Alice Springs — or Stuart as it was then officially known — had a population of only 90 people. Between it and civilisation lay a thousand miles of mostly unexplored country supporting a small number of large cattle stations. Central Australia at that time carried barely 1,000 sheep and 260,000 cattle, with large tracts unpopulated by white people or their cattle. Few people then recognised the potential of the great outback.

And so the longest Reso trip began when the train left Melbourne on 2 August 1927 at 2.15 pm. It is clear from an instruction pamphlet issued to the travellers that many were prominent citizens. They included a doctor, dentist and chemist, who offered their professional services en route. A leading naturalist and the SA government geologist were aboard to lecture the party on scientific and other matters. Another passenger took responsibility for the loaned radio receiver carried for use on both the trains and the road convoy.

TELEPHONE. The consist of the special trains bears out VR's determination to provide the best possible travelling conditions: three sleeping cars, a dining car, the observation car Norman, and two special service cars, including Avon. Even a VR clerk was provided to write passengers' telegrams and letters. Observation car Norman had a telephone connected for its short stay at Spencer Street Station.

The broad gauge train followed the route of the Melbourne Express (as The Overland was still called), which was then being re-equipped with Pullman cars and Webb's big SAR engines. One must assume the train entered Adelaide behind one of the big American-style engines — nothing less would have suited the occasion. Bypassing Adelaide's station (then under construction) and going around the Gaol Loop for a direct run from the south line to the main north line, it headed for the break of gauge at Terowie. The scheduled arrival time was 10.45 am, just 21 hours out of Melbourne.

From Terowie, a narrow gauge (1067mm) passenger train, provided jointly by the South Australian and Commonwealth Railways, headed north to Quorn. It was probably hauled by a T-class, then the largest loco available on the Peterborough Division. Reversing direction at Quorn, a CR crew took over, with one of the 14 new Queensland-designed NM class 4-8-0s at the head for the long haul to Marree and Oodnadatta, then the railhead for the Great Northern Railway.

North of Terowie, the train was a mixed consist of SAR and CR cars, again including the best sleeping and dining cars available.

From the photographs, the majority were SAR or former SAR end-platform cars, but one newer CR passenger/brakevan appears immediately behind the engine's water gin and another at the rear. At mid-train is one of the SAR's magnificent 12-wheel sleepers, and there are also "short Tom" and "long Tom" sitting cars visible.

The train was traversing the full extent of the railway north from Adelaide to Oodnadatta that would one day link up with Alice Springs and Darwin. While the line north of Adelaide had reached Burra's copper field in 1870, and extended through the break of gauge at Terowie to Quorn in 1882, the main effort to form a north-south transcontinental railway had begun from Port Augusta in 1878. The light narrow gauge line struggled through the rugged Pichi Richi Pass to Quorn, then on through the Flinders Ranges to reach Marree in 1884 and Oodnadatta in 1891. Here the railhead stuck for another 38 years, a terminus in the middle of nowhere.

TRANSFERRED. The Port Augusta to Oodnadatta Railway was transferred by the State of South Australia to the Commonwealth on 1 January 1911, in accordance with the Northern Territory Acceptance Act of 1910. From the date of transfer, the railway was leased by the Commonwealth to the state and worked under an agreement as part of the South Australian railway system.

On 1 January 1926, the Commonwealth Railway Department took responsibility for train operation over the CAR and introduced its own locomotives and rollingstock. The Central Australian Railway (as it was becoming known) was to be extended from Oodnadatta to Alice Springs, a distance of 293 miles (469 km), opening on 2 August 1929. Until the completion of the railway to Alice Springs, a weekly train was run as far as Oodnadatta, becoming known as the Ghan.

When the through line was eventually opened, a fortnightly train, complete with sleeping and dining cars, ran to Alice Spings.

OUTBACK ADVENTURE
The five passengers of Victoria Rail Dodge car 14 pose for motor driver Roy Renfry on the way to Alice Springs in August 1927.

Alas, it was never continued to link with the Northern Railway from Darwin at Birdum. What's more, the difficult, flood-prone route north of Marree was to be the line's ultimate downfall, and the route followed from Quorn to Oodnadatta by the Reso train succumbed to standard gauge lines between 1956 and 1980.

But the concrete sleepers and long welded rails were far in the future as the little NM chuffed its Reso load northward, scheduled to reach Oodnadatta 1,071 miles (1714 km) from Melbourne, at 5 pm on 4 August 1927.

Despite the heat, dust, sand and limited water on the narrow gauge train, the easiest 688 miles (1100 km) of the journey had been covered in just two days. Oodnadatta, with a population of about 200, was a true outpost: a bank, post office, hotel, Inland Mission hostel, a store, all served by a fortnightly train.

Here a convoy of 16 Dodge cars, two Dodge service cars and a one-ton Graham Brothers truck waited to begin the journey that would generally follow the route of the future railway to Alice Springs. The cars carried 87 people — 60 passengers, plus cooks and motor drivers.

Each car was to hold a driver and up to five passengers. The cars were completely open, not even equipped with the folding canvas hoods of the time. This explains the suggested motoring dress of sports coat, riding breeches and leggings, soft shirt, woollen underclothes, boots, felt hat, oilskin (for the rain), dustcoat, motor goggles and fly net. Balaclava caps were suggested as being useful for sleeping out, something some of the travellers were apparently reluctant to do. The point was gently made in the instructions that even Governor's parties slept out in this country.

INSTRUCTIONS. Accompanying the motor cavalcade was the well-known SA motorist Murray Aunger, who was then engineer in charge of SAR's motor transport. The tour beyond Oodnadatta was to be run more or less on military lines. Consider some of the instructions to the 20 motor drivers:

"Cars will be numbered and will keep that order right through to Central Mount Stuart or Barrow's Creek, whichever point is made the terminus, and on any deviations. On the return trip the cars will travel in the reverse order, with the exception of No. 1 car, which will still lead followed by 16, 15, 14, etc.

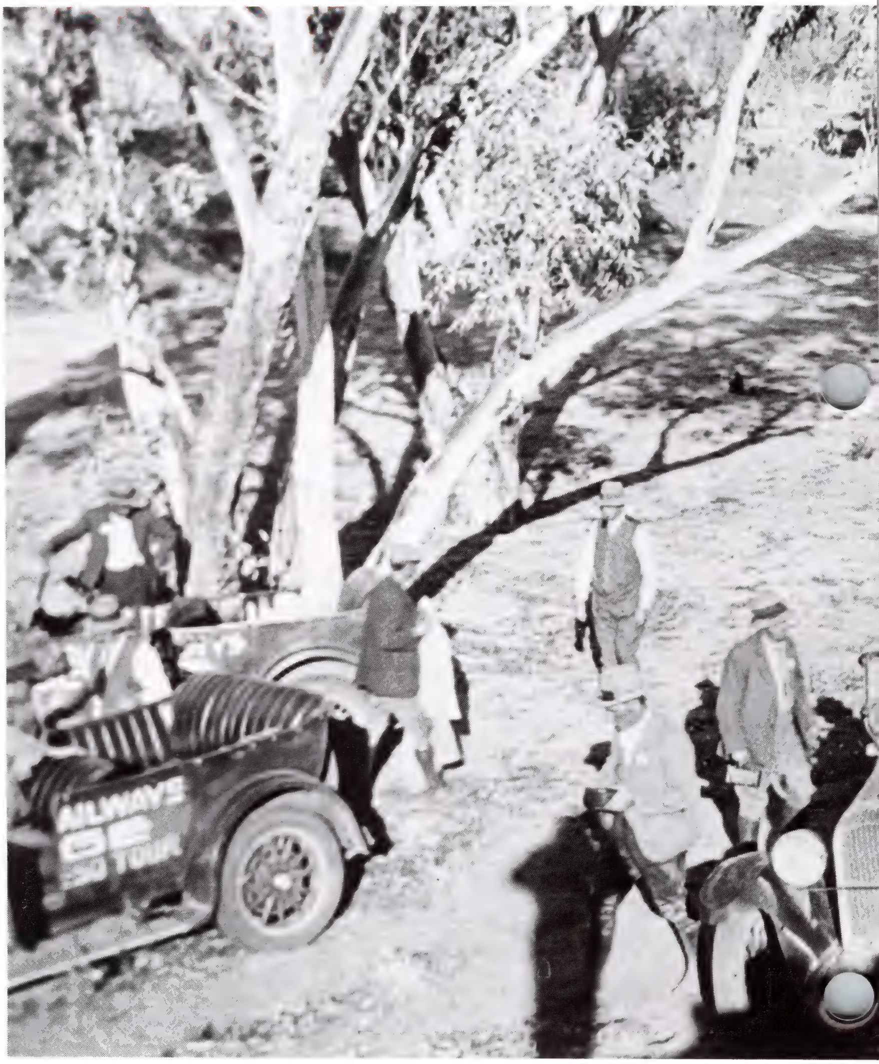
"In order that the party will experience a minimum of dust, cars will spread out as far as practicable, the only stipulation being that the driver of each car must keep the car in rear in view; otherwise he is to slow down, or, if necessary, pull up. Passengers in the rear seat can help the driver in this connection.

"At dry river bed or creek bed crossing points, drivers must not cross whilst another car is en route. If there are any pronounced disabilities in crossing necessitating the use of matting the leading cars will wait until the rear cars have crossed before the column moves off again.

"The formation of cars at stopping places will take the form of a crescent to be indicated on the ground with six feet between cars to permit of table being erected therein." (Photographs show that this instruction was not obeyed.)

"If any car has a breakdown that appears to necessitate stopping for more than five minutes, the driver will immediately wave a handkerchief to attract attention of the car in front. The car in front will pass the signal on until it reaches the leading car. If a car is disabled it will be necessary for the column to be held up and the Officer Supervising Motor Transport will return to the disabled car as it is not proposed to leave any car on the road."

DUMPS. Petrol, food and wood dumps had been set up along the route with the aid of camel and donkey teams. These were located at camps amid the gums fringing the dry river beds. Petrol was available only at Oodnadatta, Charlotte Waters, Horseshoe Bend, Maryvale Station, Alice Springs, Ryan's



MAKING CAMP
The 1927 Reso expedition to Central Australia reaches a prepared campsite alongside a dry river bed.

Well and Teatree Well, points along a route of 880 km. Each car carried just one spare two-gallon can of fuel, and one can of radiator water.

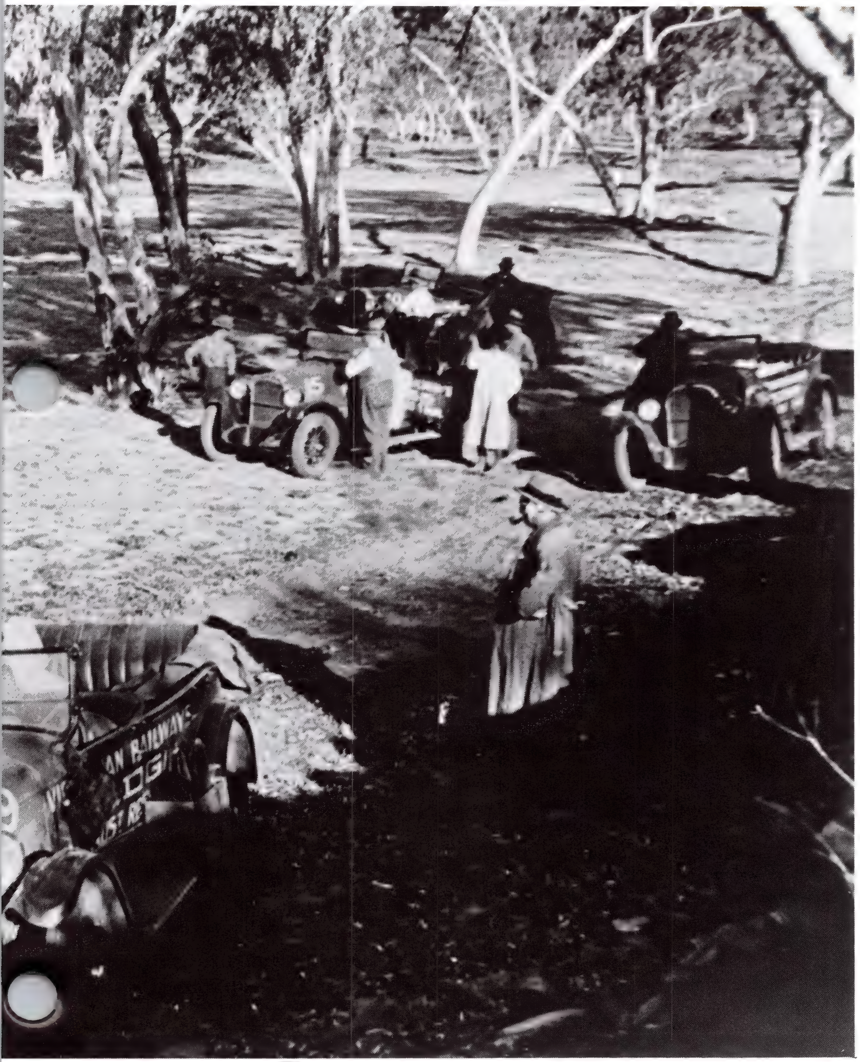
Mr Roy Renfry, one of the motor drivers, took the photographs accompanying this story. In a letter he wrote from Alice Springs on 12 August, he says the tour successfully reached the Barrow Creek area, 1215 miles (1944 km) from Adelaide or 527 miles (843 km) from the Oodnadatta railhead.

Although an experienced outback driver, he complained about the hot weather and sunburn, and remarked that "the country is very dry, the creeks and rivers are all dry and we have a hard job getting across the sandy river beds." This was despite good rains two months earlier.

Renfry's letter was carried in the first air mail from Alice Springs, departing on 3 August in a tiny single-engine biplane and arriving in Melbourne two days later.

By arrangement with Australian Aerial Services Ltd, the four-passenger plane was available at Alice Springs from 8 to 13 August for sightseeing flights. This bonus for the Reso tourists cost the princely sum of four pounds per passenger for an 80-mile (128 km), one-hour flight. It must have been an exhilarating experience before the long, hard journey overland to Oodnadatta and thence by rail to Melbourne.

PETROL food and wood dumps had been set up along the way with the aid of camel and donkey teams.



The return jouney followed the same general route and plan, except for a stopover of six hours in Adelaide. The final leg back to Melbourne took just 16½ hours, arriving home at 11.15 am on 18 August.

Mr Charles Holmes, VR's Betterment and Publicity Board chairman and the organiser of the trip, summed up: "To me the most arresting feature of the tour was the cheerful adaptability of the Resonians to the semi-military organisation imposed upon them, their excellent effort in co-operation, and their unflagging good humour."

One Resonian, Elmer G. Pauly, the US Trade Commissioner, said: "I can say with all sincerity that I have derived more real knowledge of Australia's economic position from tours I have made 'a la Reso' than I could possibly have obtained through the study of volumes."

SUCCESS. After the Central Australian trip, apparently a huge success, there were more Reso trains in Victoria before another interstate trip in April 1929, going north as far as Denman and up the North Coast of NSW as far as Murwillumbah. That train had seven cars — a staff car, a dining car, three sleeping cars, and a club car. Accommodation was provided for about 50 passengers, of whom about two-thirds came from Victoria.

The travelling was mostly at night so that the passengers could visit almost every point of interest in the dairying and allied industries on the trip if 1350 miles (2160 km). A photo exists of 3661 on this train in NSW.

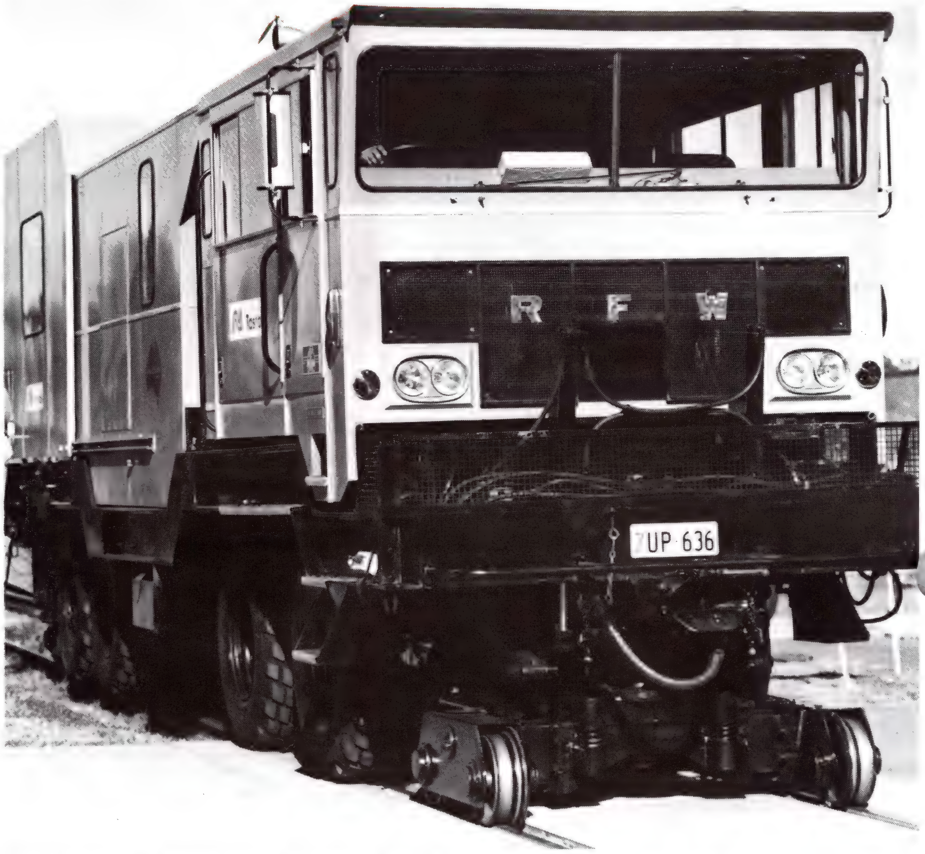
Reso trains made trips every year thereafter to various parts of Victoria until World War Two put a stop to them. In June 1954, with all the restrictions on train services removed, Reso tours of Victoria were resumed with a tour of the Murray Valley and north-east Victoria.

The popularity of the Reso idea was shown by the formation of the "Brotherhood of Resonians", which held annual reunion dinners for members. This group also shared the right with the Commissioners to nominate participants on tours.

One of the little-known activities of the Brotherhood of Resonians was the investigation in 1935-36 of the effects of soil erosion. This was followed by a campaign that resulted in the formation by the Victorian government of a Soil Erosion Committee.

Today the era of Reso is almost forgotten, but for more than three decades rail reigned supreme in spreading the word of Victoria's valuable resources.

ROAD-RAIL WORKHORSE SET FOR EXPORT SUCCESS



Truck or train? Plasser says its road-rail workhorse is like nothing else made.

Australian engineers believe they have achieved a world first with a huge railway track welding vehicle that can be driven on road or rail at up to 70 km/h in either direction. The vehicle can operate as a self-contained unit on all three Australian rail gauges, and then use its own hydraulic gear to pick itself off the track when it is more convenient to travel by road.

The manufacturer is Plasser Australia Pty Ltd.

"The machine has a number of export prospects because of its extreme versatility," said Plasser's managing director, Mr Helmut Hofstadler. "It can either be used as a stationary flash-butt welder in a siding, or travel throughout the rail system as a mobile unit on track.

"The machine can shift quickly to other locations by road without interrupting busy railway operations."

Plasser completed the first of the new butt welders for Australian National's Tasrail, and is building another for New Zealand Railways Corporation.

Special-purpose truck manufacturer RFW and air suspension specialist Air Springs Supply helped the company produce the 30-tonne design, which has retracting, adjustable railway bogies at each end and eight-wheel-drive through rubber tyres.

Gauge conversion of the Plasser bogies is quickly performed by insertion or removal of spacers. The eight 14.00-by-22.5-drive wheels, with super single tyres, have a hub attachment system that enables the track to be adjusted to suit all three Australian rail gauges (1067mm, 1435mm, and 1600mm).

"Outstanding performance is attained on rail because all tractive and braking effort is through the rubber tyres," said Mr Hofstadler. "Subject to track gauge and conditions, the vehicle is capable of the same maximum speed on either road or rail - and in forward or reverse directions."

The vehicle has a 350kw, 12.6 litre, V8 turbocharged and aftercooled diesel engine. It powers not only the main drive, but also the hydrostatic drive, crane, other hydraulic equipment, and 350 kVa generator. One engine was used to save weight. The engine and transmission have GM D-DEC and Allison ATEC computerised control to achieve optimum rpm for welding (about 1 500rpm) and travel (about 2 100rpm).

The mobile flash butt welding system is fully self-contained on the truck tray. It incorporates:

- A K355A welding unit.
- A retractable slewing jib crane.
- A 330 kVa alternator.
- Electrical controls and switchgear.
- Refrigerated water cooling system for the welding unit.
- An electronic recorder for weld quality control.
- A rear driving control station for reverse travel on rail.

During operation, rail ends are gripped hydraulically with a force of about 1 250kN. The water-cooled copper jaws that grip the rail ends also transmit the 20 000A welding current for the flashing process.

"Before we built the machine, we had a look around the world to see if there was anything versatile enough to meet the specifications. There were other road-rail machines, but nothing came close to the standards of performance and durability expected by Australian National. This is a world leader," said Mr Hofstadler. He believes the machine will attract interest in Europe, Asia and the Pacific, and particularly the USA.

Construction and testing of the vehicle were supervised by one of Australia's most experienced builders of specialist trucks, RFW's managing director Mr Bob Whitehead. Mr Whitehead said the new butt welder was an all-Australian innovation, from blueprints to the special high tensile U-channel chassis steel developed in Australia by BHP's Long Products Division at Whyalla.

"It is one of the rarest vehicles we have made in more than 40 years of making some pretty bizarre vehicles – from explosives hole diggers to the all-wheel drive bus which explorer Hans Tholstrup took around Australia.

"Yet, for all its durability, it rides as smoothly as an express.".

A specially designed front suspension was mounted by Air Springs outside the perimeter frame chassis, enabling space within the chassis to be used for the packed electrical, hydraulic and drive equipment.

For further information, contact Mr Helmut Hofstadler, 2 Plasser Cres., PO Box 537, St Mary's NSW 2760 (telephone (02) 623 9033, fax (02) 623 6502).

STAINLESS WAGONS CAN CARRY MORE ORE

The world's biggest capacity stainless steel iron ore wagons known to be built have undergone a two-month trial at the Mt Newman iron ore project at Port Hedland.

The seven wagons, built at Comeng's Mittagong works, have the potential to increase gross loads from today's maximum of 120 tonnes to 160 tonnes. Mt Newman ordered them in July 1987 as part of a research project with Comeng.

BHP Stainless produced a special grade of stainless steel for the four flat-bottom and three drop-belly wagons, all described as "lightweight" vehicles.

The reduction in tare weight and increase in load capacity have been achieved both through the use of stainless steel and by new design features.

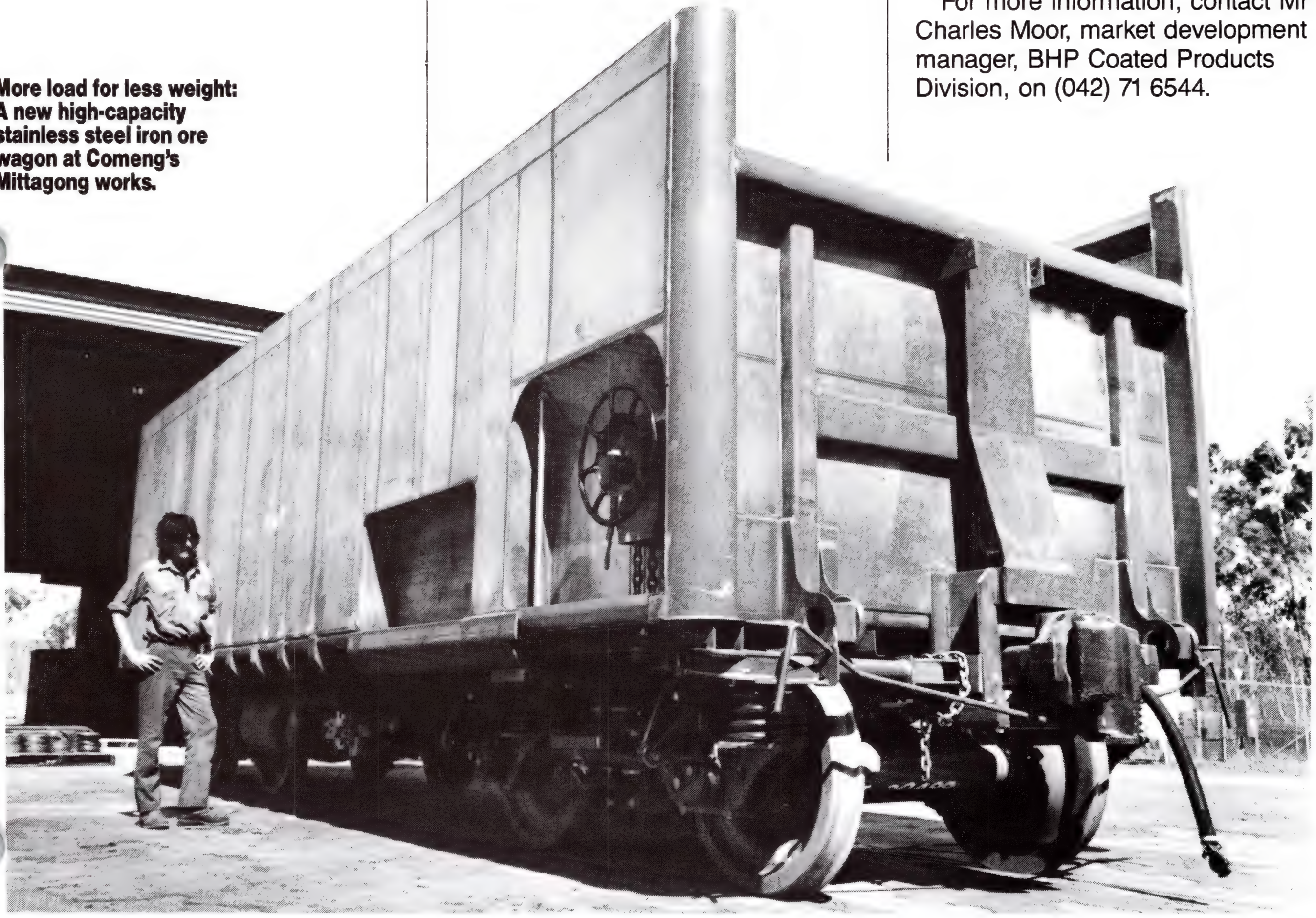
Because stainless steel is highly resistant to corrosion, the wagon walls can be thinner than usual, allowing bigger loads.

Weight is also saved by dispensing with bogie castings, half the total tare weight of the traditional wagon. The wheel sets are held in place by a simple linkage mechanism, which also enables them to steer through curves. The new independent suspension is also expected to reduce wear on wheels and rails.

Load capacity of the new wagons was further increased by having the wagon walls outside the support pillars.

According to Mt Newman, the maintenance cost of carbon steel wagons has increased substantially over recent years. Stainless steel is expected to greatly reduce these costs.

For more information, contact Mr Charles Moor, market development manager, BHP Coated Products Division, on (042) 71 6544.



More load for less weight: A new high-capacity stainless steel iron ore wagon at Comeng's Mittagong works.

3801 RIDES THE TV SCREENS

LEGEND ON VIDEO

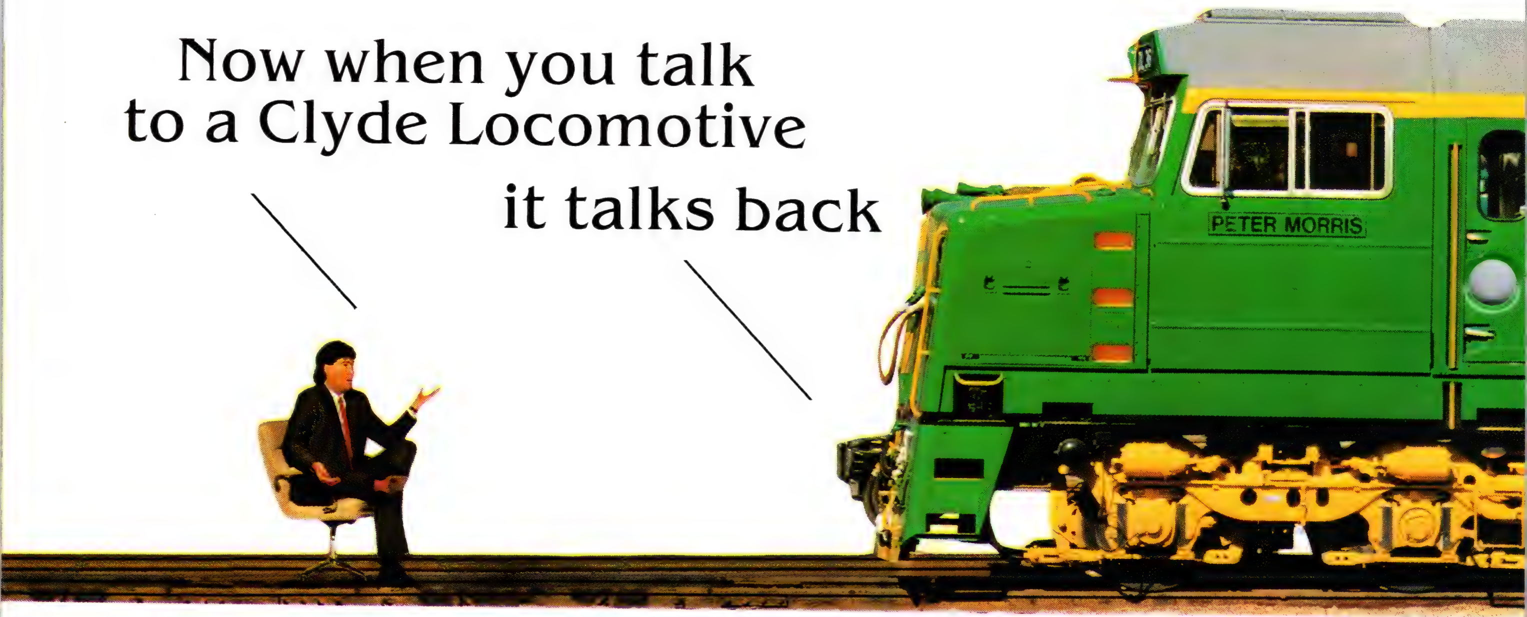
3801 — A Legend in Steam

Inform and the ABC, 1988, $42.50. At all ABC outlets.

Although only issued in mid-1988, this video has sold more than 5000 copies and thousands more have been ordered for sale in Britain and the United States. Without doubt, the tape is one of the most popular ever offered to rail enthusiasts, and its sales have been boosted by 3801's Bicentennial Steam Tours throughout Australia.

The 3801 video is introduced by Jim Revitt and features a vast amount of footage from the 16mm film collection of Jim Powe. At the beginning, we are introduced to the 3801 song, composed by Ray King and Ron Russell and performed by their group, Chullora Junction. We then see valuable footage of the manufacture of 38 Class locomotives at Clyde, and progress to the commissioning of 3801 in January 1943.

We also see the record-breaking run on the Newcastle Flyer (2 hours 1½ minutes), a record that was to stand until late in 1988 when an XPT pared the time, and witness the official phasing out of passenger travel by steam train in New South Wales in 1969, and the famous 3801-powered Western Endeavour run from Sydney to Perth in 1970 and to Marree in South Australia in 1972. Easter of 1973 saw 3801 and 3820 haul a

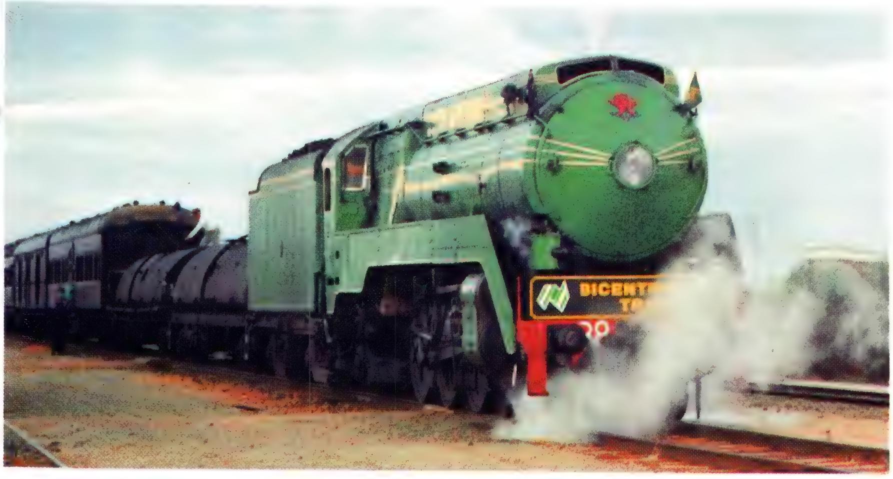


Inside our new locomotive, we've installed special sensors that monitor its most important mechanical functions. When something goes wrong you just ask your Clyde locomotive to show you where it hurts. The sensors tell the microprocessors, and the microprocessors tell you.

The advantages of all this high technology are clear.

Now, you can diagnose how well the locomotive is running while it's in operation. And most minor problems won't have the chance to develop into more serious and costly problems. Because you'll be able to identify them first.

While all this talk is going on, the conversation is being recorded. The microprocessor's memory keeps a running log of the engine's performance.



The legend on its longest run: Locomotive 3801 on its way to Perth from Sydney during the 1988 Bicentennial Steam Tour.

capacity load to Melbourne, the first steam train between the two capital cities. Then, in November 1986, 3801 returned to service after 10 years' retirement and a three-year rebuild at Newcastle State Dockyard.

There are many delightful sequences in the video that will stir nostalgic memories. In particular, there is a sensitive interview with veteran railwayman Jack Sparkes, who was a fireman and driver of 3801 and who has a deep affection for the locomotive. His memories of 3801 cover almost 30 years of intimate association.

Finally, we see a detailed pictorial record of the journey of the Western Endeavour from Sydney to Perth in 1970. This was the first time a steam train had made the through journey across the Continent, a feat not repeated until May of 1988, when 3801 did it again, this time powering the Bicentennial Steam Train on the 3861km journey.

The video runs for more than an hour and contains some of the finest steam train footage ever seen in Australia. Sound recording, too, is of a high standard. 3801 – A Legend in Steam is heartily recommended to the rail enthusiast.

That's extremely useful in tracing the exact moment any malfunction has occurred.

But that's just one side of our brain. The other side controls such vital functions as load control, wheel creep and dynamic braking.

Just contact us at Clyde Engineering at Granville, we'll be glad to show you how we gave the brawniest locomotive on the tracks ·ıst what it needed. Brains.

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Prom - 10/40

CELEBRATING NSW RAIL HISTORY

THE RAIL BLAZERS

The Greatest Public Work: The NSW Railways, 1848 to 1889

By Robert Lee

Hale & Ironmonger, 1988, $29.95.

With Iron Rails

By David Burke

NSW University Press, 1988, $29.95

Australia's Bicentennial year has seen the production of two books devoted to the history of railways in New South Wales.

Publication of the first in 1988 may be something of a coincidence; it is one of a series of histories produced by the Public Works Department of New South Wales. It is not generally known that the construction and operation of the New South Wales Railways in the years before 1888 was largely the responsibility of the Public Works Department.

The Greatest Public Work records the era of development of the trunk line railways more than a century ago, and of the primary and secondary industries that blossomed with the railway's progress. Life was transformed in towns and on previously isolated farms far from the Eastern seaboard.

The achievements between 1848 and 1889 were considerable. Sydney's railway was not the first in the Australian colonies but it was opened just 30 years after the first passengers and goods were carried by locomotive in England. The company formed to build and operate the NSW railway became insolvent, hence the entry of the New South Wales Government and the Public Works Department. The Greatest Public Work is the story of what the politicians did with their railway in its formative years.

Robert Lee notes that there is no comprehensive history of the NSW Railways. His book provides an excellent record of the early period, with a text that is detailed but very readable. Mr Lee has the ability to transform his documentary sources into a first-class narrative. There are interesting snippets, too. He tells us, for example, that the design of some early NSW locomotives was adapted from those used in the Iberian Peninsula. Mr Lee should be encouraged to extend his research into later periods of NSW history.

The design of the book also deserves praise. References are not at the end of chapters or at the foot of pages but in wide side margins, making for easy reference to the sources of statements.

The title of the second book reviewed here is from a poem by Henry Lawson, which includes the words:

"The mighty bush with iron rails,
is tethered to the world".

With Iron Rails was designed as a Bicentennial history of the railways in New South Wales and sponsored by the State Rail Authority. It is not a comprehensive history, but a magnificent collection of photographs and paintings depicting the growth of railways up to the present. Tens of thousands of photographs were reviewed before the final selection of some 700 was made. Many of them have not been published before, and they come close to making the accompanying text incidental.

Since photographs from earlier days are obviously limited, some illustrations appear in both books reviewed. With Iron Rails tends to win on reproduction, but its colour plates disappoint. Both volumes, for example, feature the coloured cover of The Railway Guide of New South Wales of 1879 – and leave the reader wondering what the actual colours of the original Guide were.

David Burke, author of With Iron Rails, is an established writer on railway history in Australia, so that the text is informed. Still, we must query his description of the Reso Train that toured New South Wales during the 1920s. Similar trains operated in most Australian states and were designed to show city businessmen the progress being made in rural districts.

Both works are reasonably priced: for an investment of under $60 the reader may obtain two interesting and well-presented contributions to Australia's history.

Since this review was written, NSW University Press has arranged to reprint With Iron Rails to improve the quality of the colour reproduction.

WINDOW SEAT

State Rail's Chief Executive Ross Sayers (left) and driver Ted Daley enjoy the moment of achievement after the XPT City of Newcastle's record-breaking run between Sydney and Newcastle.

XPT BREAKS A 24-YEAR-OLD MARK

RECORD RUN

In the highlight of State Rail's 1988 Railway Week, the sleek XPT passenger train took on the Sydney-Newcastle speed record that has stood since the legendary 3801 steam locomotive made the 168km trip in a mere two hours, one minute and 55 seconds back on 24 July 1964.

Nearly twenty five years later, on Sunday 9 October, the air-conditioned XPT City of Newcastle powered out of Central Station in a bid to break the record.

Carrying a full 400 passenger load, including the new Chief Executive, Mr Ross Sayers, and coping with normal track maintenance and speed restrictions, the odds seemed to be against success.

But, cheered on by spectators along the line and passengers on board, the seven-car train reached

The new record of one hour, 55 minutes and 52 seconds took more than six minutes off the famous steam loco's great achievement.

Newcastle Station before 11.30am to write itself into the history books.

In control for the trip was Mr Ted Daley, a train driver since 1952 making his second-last intercity trip before retiring. His train reached a top speed of 156km/h on its run.

Although it has lost one record, the official Bicentennial steam locomotive 3801 remains the only one of the steam era to make the epic crossing from Sydney to Perth and back.

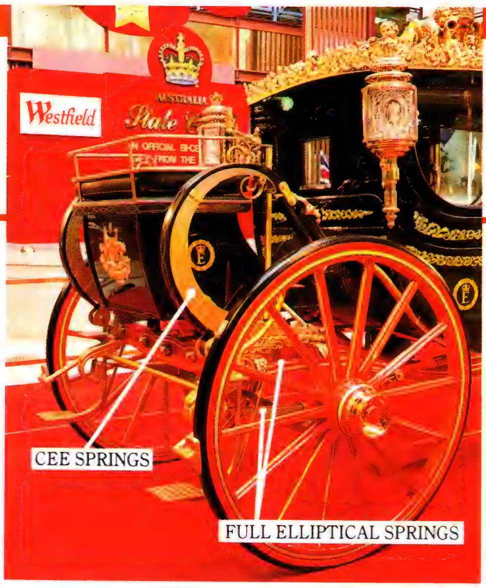
The great locomotive made the crossing again this year as part of its special Bicentennial program.

Spring Makers

FOR THE STATE COACH

Lovells Springs were chosen to produce the beautiful cee springs and the full elliptical springs used to suspend the magnificent State Coach. Lovells Springs are one of the few springs companies in the world capable of producing these springs, which are a work of art.

LOVELLS SPRINGS



CRAFTSMAN BUILT SPRINGS

The same craftsmanship that went into building the coach springs goes into every spring made by Lovells Springs.

Head Office: 199-209 Parramatta Road, Homebush, N.S.W. 2140. Telephone: (02) 76 0501.
Also at Parramatta (02) 630 1234. Blacktown (02) 621 3676. Flemington, Vic. (03) 376 0777.

Mr Michael Schrader and Mr Alan Crawford after negotiating the Kangaroo Pass agreement.

KANGAROO PASS OFFER TO VISITORS

Railways of Australia and Greyhound Coaches have pooled resources to provide overseas tourists 28-day unlimited travel throughout Australia with the new Kangaroo Road 'N Rail Pass.

The Road 'N Rail Pass will be available in all overseas markets through representatives of Railways of Australia, and also the Greyhound offices in Auckland, New Zealand.

Australian routes totalling 90 000km are offered in the unrestricted travel pass, which costs $A1000 for the first class pass and $A750 for the economy pass.

By careful planning of their itinerary, visitors to Australia will be able to visit every capital city and all of Australia's most popular tourist attractions – including the Great Barrier Reef, Gold Coast, Ayers Rock, Sydney Harbour and Opera House – in air-conditioned comfort during the 28 days for which the pass is valid.

The marketing agreement for the Kangaroo Road 'N Rail Pass was negotiated by Mr Michael Schrader, Executive Director of the Railways of Australia Committee, and Mr Alan Crawford, managing director of Greyhound Coaches.

CHOPPER SQUAD

Railway repair staff in State Rail's Hunter region may soon be airlifted to train breakdowns. State Rail is studying submissions from helicopter operators to provide a 24-hour, seven-day emergency service.

Repair crews and spare parts are now moved to breakdown sites by truck or, if there is no road link, on foot. Airlifts would cut repair times by several hours.

Use of a chopper would save cancelling 84-wagon coal trains – saving State Rail more than $1 million in annual revenue.

QUEENSLAND VIDEO AIMS TO REDUCE VANDALISM

Queensland Railways' anti-vandalism campaign featuring a rock video entitled Don't Be a Loser reached all secondary schools in the Brisbane area by the end of 1988.

The campaign now goes to the North Coast and Gympie areas when electric trains run from Gympie to Brisbane early this year.

The Queensland Transport Minister, Mr Ivan Gibbs, said the educational campaign was aimed at making students understand the futility of vadalism.

“While we can never realistically wipe out all vandalism, I'm sure this educational campaign will mean a cleaner and safer rail system for passengers,” he said.

The video uses teenage characters and rock music to get the message across to the target audience – grade eight students.

It is part of the three-pronged attack on vandalism launched before World Expo. The first two stages involved an awareness and publicity campaign aimed at railway staff and the public.

Vandalism costs Queensland Railways an estimated $500,000 a year.

“Through the medium of a rock'n'roll video, we set out to show that vandals are losers and nothing else,” Mr Gibbs said.

“They lose the respect of their friends, they lose their parents and taxpayers thousands of dollars, and most of all, they could lose their lives.

“The only thing that can be gained from vandalism is a police record, hefty fines and a jail sentence.”

Farmer Peter Harris of Dowerin, West Australia, and Westrail Operations Officer John Browning have their picture taken for the first issue of Ontrack.

REACHING FARMERS

Agriculture provided $84 million of Westrail's income last year, so keeping the customers informed is just as important as knowing what the customer wants.

A new quarterly publication mailed directly to 8000 farmers is Westrail's answer to the challenge.

Ontrack contains both service information from existing publications and important new information.

The first issue, published in October 1988, gives farmers this year's lower grain freight rates in detail and looks at the huge task of moving the grain.

WINDOW SEAT

“We're letting people know Westrail is a business-like organisation and we are improving,” said Freight Business Manager Martin Baggot. “If our clients can have confidence in us and what we're doing, they will trust our new service.”

The next issue of the magazine will look at how new techniques for railing and delivering fertiliser will provide a better and cheaper service for farmers.

“Each issue will relate to the farming year – the delivery of oil could be combined with the task for seeding, an important area when partial deregulation is taken into account,” Mr Baggot said.

“I can see Ontrack extending to other resource-based areas, especially to interstate traffic and freight forwarders”.

UNDERGROUND LOCO CONTRACT

A West Australian engineering company, George Moss Ltd, has won a $140 000 contract to supply a trolley locomotive to India.

The contract has been awarded by Hindustan Zinc. The 10-tonne locomotive will be used in the company's underground mine at Udaipur.

Gemco won the export contract against competition from Indian manufacturers. The managing director of Gemco, Mr Frank Quilty, said the company's success was because of its superior technology and expertise in manufacturing mining locomotives and ancillary equipment.

Powerful Experience

A Queensland joint venture for the Main Line Electrification Project

The CLYDE/ASEA-WALKERS joint venture provides Queensland Railways' Electrification Project in Central Queensland with a wealth of engineering experience. This powerful venture combines ASEA know-how and advanced technology in the field of AC electric locomotives, with the extensive experience of Clyde Engineering and Walkers Limited in the design and manufacture of rolling stock.

ASEA has more than 70 years experience in electric traction and in particular more than 15 years experience in electric traction with thyristor techniques.

Clyde Engineering Motive Power Division has been a constant supplier of locomotives and other railway rolling stock for more than 90 years. In 1948 Clyde became the first Associate of the Electro-Motive Division of General Motors Corporation to manufacture the GM diesel electric locomotive outside the domestic USA.

Since that time, Clyde has supplied over 1000 diesel electric locomotives to Australian Railways.

Walkers Limited has been involved in the design and construction of railway rolling stock since 1890. More recently they have supplied large numbers of diesel hydraulic locomotives and stainless steel EMU vehicles to Queensland Railways. A total of 280 EMU vehicles have been ordered so far, including the new inter-urban trains to run between Brisbane and Rockhampton by 1989.

CLYDE/ASEA-WALKERS is able to offer a strength of technical resource and wealth of design and manufacturing experience second to none.

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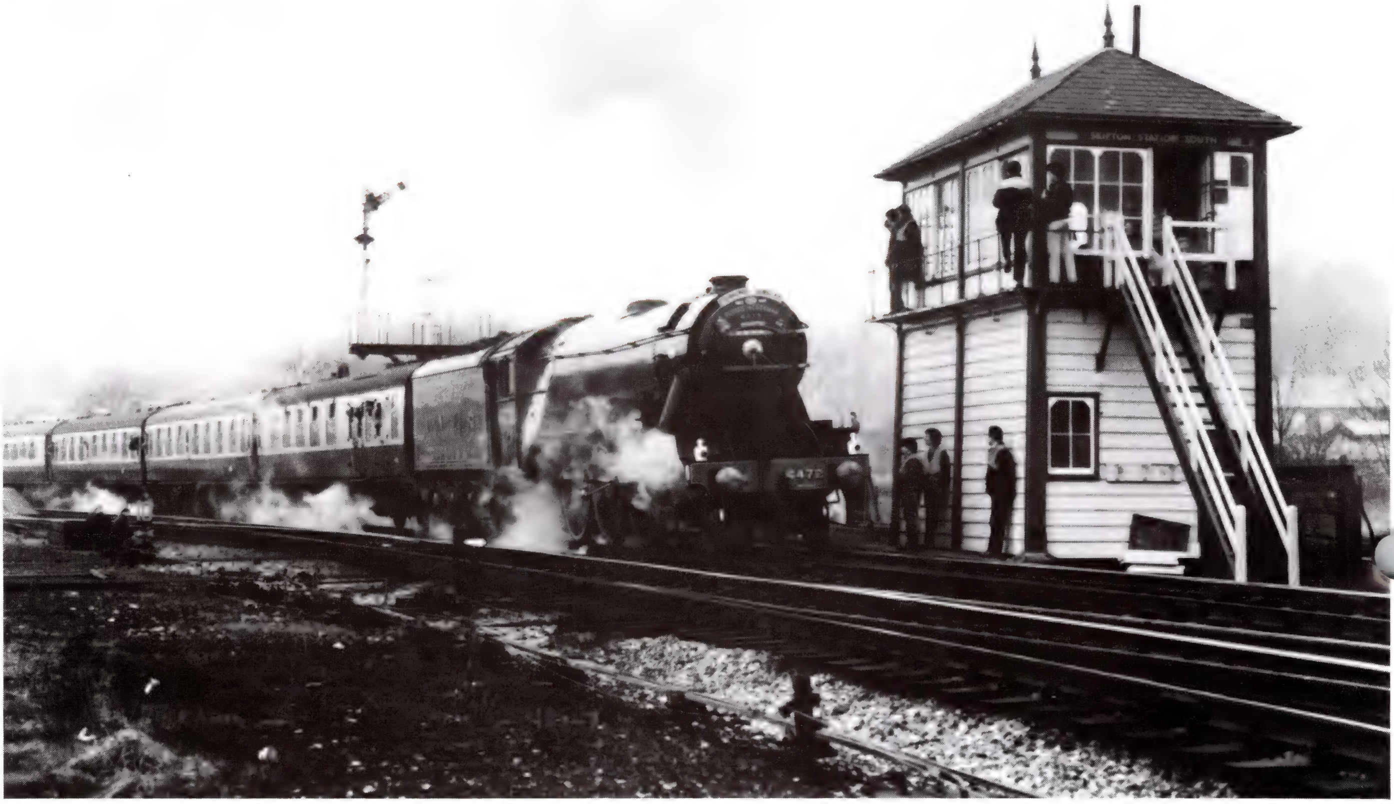
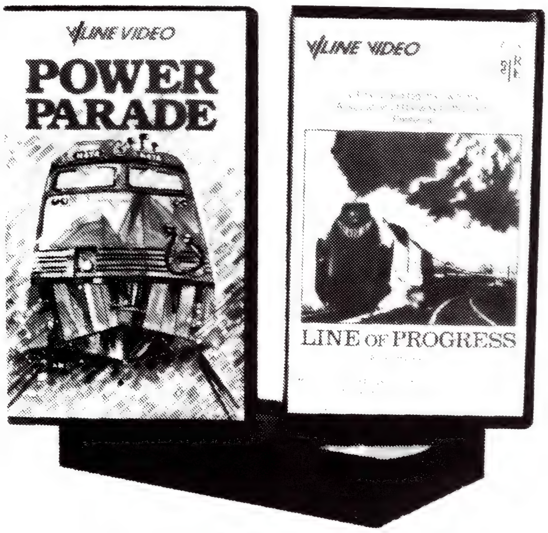
WINDOW SEAT

The 4472 Flying Scotsman (or the Flier as steam enthusiasts know it) has been in Australia as part of Britain's contribution to the Bicentennary. Here it is seen during its Diamond Jubilee run in March 1983 on the way to Leeds.





POWER PARADE & LINE OF PROGRESS

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POWER PARADE

Power Parade shows the development of steam and diesel-electric locomotives of the Victorian Railways and V/Line. Power Parade has some rare historical footage including Polly, the first locomotive built at Newport Workshops, in action as a steam crane.

Also included is action of a narrow gauge Garratt in the Otway Ranges, S Class steam locomotives, both in their original and streamlined forms, R752 hauling a wheat train and footage of X, A2, D4, C, Old R and E Class locomotives.

As an added bonus, there is a photograph of every class of locomotive to run in Victoria included.

But Power Parade is not just about nostalgia. Power Parade has present day action including the powerful sight of two C Class diesel-electric locomotives hauling more than 1,000 tonnes of freight up Ingliston Bank.

V/Line's newest locomotives, the N and G Classes, are featured in action as is the final run of the L Class mainline electric locomotives.

Power Parade is hosted by Gerald Dee, who spent many years on the footplate and is currently V/Line's Fuel Conservation Officer, and is narrated by well-known railway historian Bruce McLean.

LINE OF PROGRESS

A fascinating compilation of footage from the past and the present which highlights two historic events for passenger rolling stock in Victoria. Two separate and contrasting films - made nearly half a century apart - that take you from the days of Orient Express-style opulence and liveried conductors, through to the contemporary luxury of air-conditioned Country passenger trains.

THE SPIRIT OF PROGRESS - AUSTRALIA'S WONDER TRAIN.
This marvellous journey into the days of steam was created in 1937 to celebrate the construction of the original Spirit of Progress. The film has been restored from documentary material in the railway archives. Picture and sound enhancement have made it possible to present this film for the first time to a modern audience.

The Spirit of Progress - Australia's Wonder Train is a detailed account of the construction, unveiling and inaugural trip of a train that, in its day, was a hallmark of speed, quality and luxury.

THE RETURN OF THE COUNTRY TRAINER.
The second film in this package is a perfect counterpoint to the Spirit of Progress - Australia's Wonder Train. The stage is set in the early 1980's - almost fifty years later. The film focuses on the massive rolling stock upgrading task that was begun in 1982/83.

A new generation of artisans and designers undertake the construction. An impressive contrast to the crafts of the 1930's carriagebuilder, The Return of the Country Trainer gives a colourful insight into modern railway engineering techniques and the technical advances of the past decades.

TANGARA PROJECT AWARD

State Rail's Tangara train project has won the 1988 Institution of Engineers, Australia (Sydney Division) Engineering (Products) Excellence Award.

And the Georges River East Bridge, part of the East Hills to Glenfield rail line project, has been highly commended in the institution's public works section.

The Institution said: "The Tangara train is the first of a new fleet of 450 double-deck commuter cars, scheduled for construction over an eight-year period, from 1987 to 1995.

"While the concept of double-deck surburban electric rail passenger cars is not new, having been introduced in NSW in 1968, the designers of the Tangara set out to develop a distinctly new double-deck train set.

"The objective was to create a train passenger car with attractive styling and improved comfort, so as to induce a high level of customer acceptance and satisfaction.

"Other requirements were higher reliability and improved performance, as well as maintainability.

"An experienced industrial designer was used to develop the conceptual design – a departure from previous practice.

"Engineering features of the train include a micro-processor-based Train Management System, designed to give drivers and maintenance staff an instant picture of the status of all major components.

"This complex product was engineered by a project team (State Rail) of up to 25 engineers under the control of a project manager.

"As virtually all aspects of the train sets involved new (albeit proven) technology, the overall expertise of user and manufacturer will be considerably advanced.

"This can greatly assist in current efforts to develop the export market in rollingstock."

The Tangara is designed and manufactured by A. Goninan & Company of Newcastle. DCA Consultants of Britain were styling design consultants.

Technology developed in producing the Tangara by designers and builders A. Goninan & Co could bring the Newcastle company $30 million a year in exports.

Goninan has been pursuing export opportunities in Europe, the United States, Japan and South-East Asia. The general manager of its railway technology and products division, Warren Princehorn, said the Tangara project had led to new techniques, procedures and developments in seating, which incorporates use of vandal-resistant material of a new world standard, fire-resistant plastics, and welding technology that has attracted world-wide attention.

An important part of Tangara's technology is the use of modular components for ease and speed of maintenance. These cut operating costs and time in the workshop.

Right on track with rail transportation

The Railway Technology and Products Division of A Goninan & Co Limited has long been acknowledged as a leader in the field of rail transportation design and manufacture.

Freight vehicles, heavy haul locomotives, passenger coaches — all carry the same hallmark of excellence as Tangara, Sydney's new-generation commuter train that is designed and built by Goninan.

The Goninan/GE Dash 8 locomotives — the first to be built outside the USA — are setting new standards in diesel locomotive performance. Under licence to the General Electric Corporation of America, Goninan is building these locomotives for Westrail, Mt. Newman Mining and Australian National.

Goninan's engineering capabilities are essential elements in the company's commitment to the development of valuable export markets.

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SITTING PRETTY

Sitting adult passengers have been able to travel between Sydney and Perth on the Indian-Pacific for only $185 since last November using the new coach class sitting fare introduced by the three railway systems responsible for the service — State Rail, Australian National and Westrail.

The new fare is only 40 per cent of the economy airfare and lower than some road coach fares. Seating only 42 passengers, the spacious coach cars provide showers as well as change rooms, welcome facilities for sitting passengers on the 65-hour journey of 4348 km across Australia.

The Indian-Pacific trip has long been regarded as one of the world's greatest train journeys on one of the world's greatest trains. It offers a vast variety of Australian scenery: the Blue Mountains near Sydney, grazing country out west, the mining city of Broken Hill and the garden city of Adelaide, the silo-studded wheat country of South Australia, and the awesome limestone plateau of the Nullarbor Plain, where the train travels the "Long Straight" — 478 km of track between Ooldea and Nurina without a curve. Then there is Kalgoorlie, the goldfields capital of Western Australia, and from here the wheat belt stretches to the coast and the Darling Ranges and on to journey's end, Perth on the Swan River.

The Indian-Pacific's sleeping berth accommodation has also been modified. As well as first class sleepers, more economy sleeping berths have been provided on the three services that leave Sydney and Perth each week.

Although the changes to the Indian-Pacific were only introduced last November, an increase in passengers is already evident.

ACROSS THE CONTINENT — BY TRIKE

During the Bicentennial year, Australia has been sailed around, ridden over and flown above. Now a group of railway men has pushed its way across the continent and into the record books on an old Sheffield hand trike.

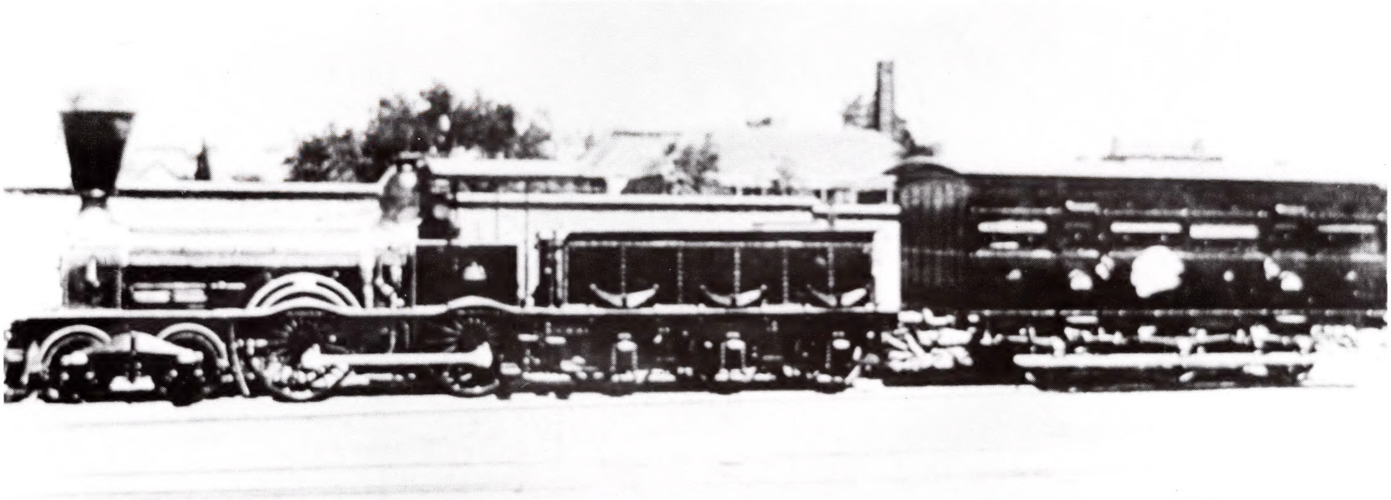
The 4523km haul is the world's longest hand trike trip.

The epic journey, in memory of Australia's railway pioneers, began in Perth on 3 September and ended at Sydney's Central Station on 9 October.

The 15-strong team, led by State Rail employees John Cooper, Ken McCauley and Ian Bairstow, had an adventure-filled journey. For example, on an isolated section of track on the Nullarbor, the party discovered an overturned vehicle and rescued the injured driver.

The trike has created great interest, highlighting the important role the railways played in opening up the vast country. It was accompanied by an historic collection of track inspection vehicles.

State Rail was a major sponsor of this trans-Australia crossing.



Only known photograph of South Australia's first Vice-regal car, taken in 1862 with the SAR locomotive Victoria. (Picture: Mortimer Library).

VICE-REGAL SURVIVOR RETRIEVED

Remains of the first South Australian Vice-regal carriage, a six-wheeler dating from about 1855, have been retrieved by the SA division of the Australian Railway Historical Society.

Built in England as a first class carriage and used on the first train to Port Adelaide in 1856, the remains are probably the oldest of a railway carriage in Australia.

It was upgraded to Vice-regal status in 1862 and, when a larger replacement was built in the 1970s, it was used as a Officers' Car. Seating 12, the car was only 25 feet (7.62 metres) long by 8 feet (2.5 metres) wide, with a ceiling height of 5 feet 11 inches (1.8 metres) at the door and 6 feet 3 inches (1.9 metres) in the centre.

Ceiling panels, carved from cedar, had inlaid sections of deep blue and red silk. Wall panels were of polished cedar, and the exterior of the carriage was trimmed with cast lead lacework.

Destruction of records by fire early this century meant that later details of its use are unknown. Around 1910 the car was acquired by a Dr Biaginni, professor of English at Adelaide University, and transported by rail to his home at Hove.

The professor died around 1973, aged 95, and the intact carriage was sold.

Sadly, the old car was neglected and was eventually cut up. The owner, Mr Gibson, fortunately removed the lounge chairs, internal cedar panels and ornate fittings.

The historical society is hoping to rebuild this historic vehicle, the remains of which are stored at the ARHS Dry Creek depot.

HELPING NATURE BEAT POLLUTION

Two scientists in Glasgow, one with British Rail and one with the University of Strathclyde, have developed a cheap and effective way of dealing with light oil pollution on railway tracks. Their success has come from giving nature a helping hand.

Minor oil leaks are usually dealt with by microbes that occur naturally in the ballast beneath the rails and which feed on the oil. In places such as stations and depots where trains stand for some time, however, the microbes cannot cope with the quantity of oil, and this can lead to the pollution of water courses. The traditional solution to this problem has been to install oil interceptors.

With research supported by Britain's Natural Environment Research Council (NERC), Roger Hughes and Dr Brian Wood have devised a new and simple solution. Rather than applying alien laboratory-reared organisms that might cause unwanted changes in the track ecosystem, they have worked out a way of speeding the degradation of the oil by introducing slow-release fertilisers. These boost the populations of the natural "oil-eating" microbes and maintain them for long periods by providing essential nutrients that are in limited supply in the ballast.

The new system has major financial benefits. At one location, for example, British Rail was asked to prevent oil pollution by installing three interceptors in track drains leading to a nearby river. The estimated cost, apart from maintenance, was £50,000 ($A103,500). Using the new natural method, the problem was solved for just £50 ($A103.50) a year – a 1000- fold saving. What is more, the fertiliser need be applied only once or twice a year, during regular track maintenance.

The technique is now in use in several places and has won an Environment Foundation pollution abatement award.

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